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A REVISION OF THE NORTH AMERICAN SPECIES OF THE PHOBERIA-MELIPOTIS-DRASTERIA GROUP OF MOTHS (LEPIDOPTERA, PHALAENIDAE)

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For some years the author has been studying the species of the relatively homogeneous group of quadrifid Phalaenidae (Noctuidae) comprising the genera *Phoberia*, *Litocala*, *Cissusa* (& *Ulosyneda*), *Melipotis* (& *Lyncestis*), *Ianius*, *Asyneda*, *Forsebia*, *Drasteria* (& *Syneda* auct), *Bulia*, *Boryzops* and *Lois* (plus a few genera not occurring in North America). A generic synopsis with tentative rearrangement of the species has already been published (Richards, 1936c) and also revisions of the small genera *Bulia* (Richards, 1936b) and *Forsebia* and *Asyneda* (Richards, 1936a). This specific revision of the remainder of the group is now presented, in necessarily brief style. Monotypical genera are only briefly mentioned as they may be separated by the generic key. The paucity of biological and life history data is regrettable but it has seemed advisable to confine such notes to the author's own observations or to data from specimens which he has determined. Dates are given from the author's notes but are far from complete.

Pending settlement of what is to be done about Hübnerian names of the *Erste Zutraege*, acceptance of which would result in radical changes in the moths which it does not seem desirable to impose on

the literature, these names are used herein in the currently accepted sense. The names concerned in this group are: *Phoberia atomaris* Hbn. (in Erste Zutraege as *Ascalapha atomaris*), *Drasteria graphica* Hbn. (in Erste Zutraege as *Euclidia graphica*), and *Melipotis jucunda* Hbn. (in Erste Zutraege as *Heliothis jucunda*). The first two of these names of the Erste Zutraege (*Euclidia* and *Ascalapha*) contained more than one species, and although the dates of actual validation of the species enters in, it seems that subsequent designation will probably preserve the names *Phoberia* and *Drasteria* in the sense used in this paper. For the third name of the Erste Zutraege (*Heliothis*), *jucunda* was the sole included species and yet due to the Zweite Zutraege is currently cited as the type of *Melipotis* Hübner. Acceptance of the Erste Zutraege, judging from a hasty checking of Hemming's books, would result in replacing *Melipotis* with *Heliothis* and hunting up another name for the species now placed under *Heliothis* and also for the subfamily that bears this name.

In 1870 Behr described eleven species from the west coast in this group: *adumbrata*, *divergens*, *edwardsi*, *hadeniformis*, *maculosa*, *mexicana*, *nubicola*, *ochracea*, *socia*, *stretchii* and *tejonica*. His collection was subsequently destroyed in the San Francisco fire and the descriptions being poor some of the names have proved troublesome. Of three of these, Behr sent cotypes to Strecker and they are now preserved in the Field Museum (*adumbrata*, *divergens* and *stretchii*). An illustration of one of these, presumably a cotype, was published in the Whitney Geological Survey (*divergens*). Henry Edwards saw the Behr collection, and there are now preserved in his collection at the American Museum of Natural History specimens of two of these marked in Edwards' handwriting "Agrees with Behr's type" (a female of *tejonica* and a male of *stretchii*—of the latter a cotype is in the Field Museum). Edwards also included photographs of seven of Behr's species in his Pacific Coast Lepidoptera, at least in the bound copy at the American Museum of Natural History (*adumbrata*, *divergens*, *edwardsi*, *ochracea*, *socia*, *tejonica* and a photo of *stretchii* labeled "*howlandi*" presumably following the then accepted synonymy proposed by Grote). Unfortunately Edwards does not indicate whether these photos are from Behr's types or other specimens but inasmuch as Behr's types were then available to him they would seem to represent authentic material, especially as the ones that can be checked to cotypes or descriptions are indubitably correct. It must be added concerning this plate

that the figures are not numbered and that the legend does not follow the same sequence but the assignment of names to the various figures seems nevertheless rather definite. Another species was disposed of by making a topotypical specimen a neotype in the revision of the genus *Bulia* (*mexicana*; Richards, 1936b). Three names remain. Of these, *hadeniformis* has been seemingly satisfactorily identified as a yellowish Californian race of *Melipotis jucunda* (Barnes Collection, U. S. National Museum). The other two names (*maculosa* and *nubicola*) are still somewhat uncertain though both names seem to apply to a northern Californian mountain race of *Drasteria hudsonica* (see discussion under these names).

In connection with Henry Edwards' papers, Dr. Alexander B. Klots has called the author's attention to the fact that the last several parts of Henry Edwards' Pacific Coast Lepidoptera never appeared in the Proceedings of the California Academy of Science, despite being so labeled, for the simple reason that this journal suspended publication in 1876. This does not affect the validity of the names concerned but only the correct reference to be used for them.

The author regrets that the high cost of illustrations has forced a considerable crowding of the figures, the use of small figures, the frequent use of partial figures and the omission of many figures he has and would like to include. In so far as possible text and figures that have been given in other recent papers are omitted.

The author has had available for study in addition to his own collection, either by loan or visits, the material in the collections of the U. S. National Museum (including the Neumoegen and Barnes Collections), American Museum of Natural History (including the Henry Edwards Collection), Cornell University, and some material and notes on types in the British Museum, Canadian National Collection, Field Museum (including the Strecker Collection), Museum of Comparative Zoology, Los Angeles Museum, Academy of Natural Sciences of Philadelphia and a number of private collections. The author's thanks are due the curators and owners of these collections for their assistance.

ARTIFICIAL KEY TO GENERA AND SUB-GENERA

- | | |
|--|-------------------|
| 1. Fore tibiae with terminal claws or claw-like spines | 2 |
| 1. Fore tibiae unarmed | 5 |
| 2. Middle tibiae without spines | 3 |
| 2. Middle tibiae spined (species all palearctic) | <i>Leucanitis</i> |

3. Frons smooth; fore tibiae produced into claw-like spines at apex; palpi obliquely ascending; hind wing solid brown.
Phoberia
3. Frons rough or with slight truncated prominence; palpi upturned; fore tibiae with outer and inner claws (macrosetae); hind wing not solid brown 4
4. Frons with truncated prominence with transverse ridges; sacculus of male genitalia reduced; hind wing white with terminal black band and incomplete anal lunule *Forsebia*
4. Frons rough and rounded out, without transverse ridges. Hind wing various *Drasteria* (part)
5. Thoracic vestiture composed entirely of hair; first and sometimes second segment of palpus fringed below; hind wing fuscous, somewhat lighter basally; eyes lashed behind only 6
5. Thoracic vestiture composed of hairs and scales mixed; first and second segments of palpus fringed below; eyes heavily lashed; hind wing black with three yellow or whitish spots.
Litocala
5. Thoracic vestiture composed largely or entirely of scales; second segment of palpus usually smoothly scaled, rarely fringed below; eyes not lashed; hind wing various but never black with three spots 7
6. Male antennae fasciculate *Cissusa* subg. *Cissusa*
6. Male antennae bipectinate, the apical part serrate.
Cissusa subg. *Ulosyneda*
7. Frons without pointed conical prominence 8
7. Frons with long pointed conical prominence 17
8. Hind tibiae each with two pairs of spurs; middle tibiae unspined 9
8. Hind tibiae each with only one pair of spurs; middle tibiae with few spines hidden in the vestiture; abdomen with basal crest of scales; third segment of palpus long, dilated at apex *Boryzops*
9. Second segment of palpus long, blade-like, upturned, reaching vertex of head; third segment porrect.
Bulia (*Cirrhololina*)
9. Second segment of palpus shorter, when reaching beyond middle of front the third segment erect 10
10. Orbicular a white spot defined by black *Ianius*
10. No orbicular spot present 11

- | | | |
|-----|---|---------------------|
| 11. | Third segment of palpus erect | 12 |
| 11. | Third segment of palpus porrect or almost so | 14 |
| 12. | Third segment of palpus long, two or more times its width;
frons smooth and flat; uncus of male genitalia modified
(pl. 6, fig. 14); sacculus reduced distally; hind wing black
and white, brown or fuscous | 13 |
| 12. | Third segment of palpus shorter, when nearly twice its length
the frons distinctly rough and rounded out; uncus long
and cygnated (pl. 7, fig. 8, etc.); sacculus well developed
distally; hind wing distinctly banded or fuscous. | |
| | <i>Drasteria</i> (part) | |
| 13. | Second segment of palpus smoothly scaled. | |
| | <i>Melipotis</i> subg. <i>Melipotis</i> | |
| 13. | Second segment of palpus with large triangular tuft of scales. | |
| | <i>Melipotis</i> subg. <i>Lyncestis</i> | |
| 14. | Second segment of palpus tufted above, triangular in outline;
hind wing yellowish-orange and black | (<i>Hypocala</i>) |
| 14. | Second segment of palpus not tufted; hind wing not yellow and
black | 15 |
| 15. | Fore legs heavily fringed with scales; third segment of palpus
scarcely longer than broad | <i>Boryza</i> |
| 15. | Fore legs smoothly scaled; third segment of palpus 2-3 times
as long as broad | 16 |
| 16. | Frons with low roughened prominence; third segment of palpus
about three times as long as broad; hind wing dirty white
in basal half followed by black-brown outer half.... | <i>Asyneda</i> |
| 16. | Frons smooth and flat; third segment of palpus about two times
as long as broad; hind wing solid brown | <i>Panula</i> |
| 17. | Prothorax and abdomen without crests of scales; fore tibiae
smoothly scaled | <i>Bulia</i> |
| 17. | Prothorax and abdomen with crests of scales; fore legs heavily
fringed with scales | <i>Lois</i> |

Phoberia Hübner

atomaris Hübner

Phoberia atomaris Hübner. 1818. Zutr. exot. Schm., 1: 16,
ff. 75, 76.

Lyssia orthosiodes Guenée. 1852. Spec. Gen. Lepid., 7: 296–297, pl. 23, fig. 1.

Type locality: North America. Type: U. S. National Museum.

Poaphila ingenua Walker. 1858. Cat. Br. Mus., Het., 14: 1472.

Type locality: United States. Type: British Museum.

Poaphila porrigens Walker. 1858. Cat. Br. Mus., Het., 14: 1474.

Type locality: East Florida. Type: British Museum.

Figures: Maculation: Pl. 1, fig. 1. Also colored figures by Hübner and Guenée and in Holland's Moth Book (Pl. 36, fig. 14). Genitalia and tympanum: in Richards, 1936c.

Readily identified by the figure given herein or better by the colored figure in Holland's Moth Book. It is the only species in the whole group in which the fore tibiae are apically continued into a projection or spine. It seems to the author not readily confused with anything else but in several collections Colorado specimens have been found placed under the name of one or another of the species of *Cissusa*.

Expanse: 38-45 mm.

Dates: March-April in south; April-May in north.

Distribution: New York, Pennsylvania, Tennessee, Georgia, Florida, Missouri, Nebraska, Colorado, Texas and no doubt intermediate points.

Litocala Harvey

sexsignata Harvey

Lita sexsignata Harvey. 1875. Bull. Buffalo Soc. Nat. Sci., 2: 280.

Type locality: Nevada. Types: British Museum.

Litocala sexsignata var. *deserta* Henry Edwards. 1881. Papilio, 1: 25.

Type locality: Arizona. Types: 3 at Amer. Mus. Nat. Hist.

Figures: Maculation: Pl. 1, fig. 2. Also colored figure in Holland's Moth Book (Pl. 30, fig. 39). Genitalia: in Richards, 1936c.

Readily identified by the figures cited as there is no other species with three yellow or white spots on a black hind wing. There is considerable variation in the amount of white mottling on the fore wing, some specimens being almost black with the lines barely traceable; also variation in the size and color of the spots on the hind wings above and below. Edwards' variety is based on this variation and is supposed to be the form with more contrasty fore wings, postreniform area white and spots of the hind wing larger and yellow.

lower. It is no more distinct than the opposite extreme of variation (unnamed) and is here relegated to synonymy.

Expanse: 28-40 mm.

Dates: February-May.

Distribution: Colorado, Utah, Nevada, Arizona, New Mexico and southern California.

Cissusa Walker (& subgenus *Ulosyneda* Smith)

The species of this genus are not well known, and no satisfactory revision can be given by this author until more data are at hand bearing on certain of the names that have been proposed. The names that are relegated to synonymy seem certainly synonyms, and there seem surely at least four valid species (*spadix*, *mucronata*, *indiscreta* and *valens*).

A number of the species placed in this genus by various workers up to and including the Barnes and McDunnough Check List (1917) have been removed to *Drasteria* because of their genitalia and the scaly rather than hairy thoracic vestiture. These are *biformata*, *inepta*, *sabulosa* and *scrupulosa*.

Appended is a tentative key to the various names. It is probably only of slight value. All that can be said is that it fits the few notes and specimens at hand.

KEY TO THE SPECIES OF *CISSUSA* AND *ULOSYNEDA*

1. Thoracic vestiture composed of scales See generic key
1. Thoracic vestiture composed entirely of hair 2
2. Subterminal line distinct from costa to inner margin 3
2. Subterminal line obsolete or indicated by only a few black preceding spots near costa 6
3. Subterminal line faint and incomplete or indicated by lighter spots, sometimes preceded by a few dark scales; t. a. line excurved from anal vein to inner margin *indiscreta*
3. Subterminal line complete, when faint t. a. line incurved from submedian fold to inner margin 4
4. Reniform obsolete; black shading beyond t. p. line at least opposite cell; male antennae bipectinate *valens*
4. Reniform distinct with black basal line; no black shading beyond t. p. line 5
5. T. p. line absent *subtermina*
5. T. p. line complete, sometimes faint but distinct throughout. *mucronata*

6. Moderate black or reddish spot before subterminal line between veins 6 and 7, smaller spots between veins 3 and 4 and between 7 and 8 *spadix*
6. No definite spots before the subterminal line 7
7. Reniform distinct, with light basal line, filled with brown and defined by light scales outwardly *indiscreta*
7. Reniform obsolete or practically so. Male antennae bipectinate 8
8. Subterminal line light, never totally lost, some black shading beyond the t. p. line at least opposite cell *valens*
8. Subterminal line completely absent, no definite black shading beyond t. p. *cervina*

spadix Cramer

Phalaena spadix Cramer. 1780. Pap. exot., 3: 149, pl. 275, fig. F.

Type locality: "Virginia." Types: Lost but figured.

Panula remigipila Guenée. 1852. Spec. Gen. Lepid., 7: 60. Type locality: Florida. Types: 1 ♂, probably in British Museum.

Taeniocampa vegeta Morrison. 1875. Proc. Acad. Nat. Sci. Phil., 27: 432-433.

Type locality: Dallas, Texas. Types: Recorded for Tepper Collection.

Figures: Maculation: Pl. 1, fig. 3. Colored figures given by Cramer and in Holland's Moth Book (pl. 30, fig. 9). Female genitalia: in Richards, 1936c.

The type of *spadix* was, according to the figure, grey-brown with three black spots before the subterminal line near the apex, whereas *remigipila*, according to a colored figure of the type, is red-brown and lacks the spots before the subterminal line. Nevertheless they seem to be synonymous. The type of *vegeta* is unknown to the author.

Expanse: 38-42 mm.

Dates: May.

Distribution: Florida, Mississippi, Missouri and Texas. Straying northwards (reported by Forbes from Massachusetts, and in Kearfott collection from Cleveland, Ohio).

mucronata Grote

Synedoida mucronata Grote. 1883. Can. Ent., 15: 121.

Type locality: Arizona. Type: Neumoegen Coll. (U. S. N. M.).

Figures: Maculation: Pl. 1, fig. 4. Male genitalia: in Richards, 1936c.

The type of *mucronata* is grey-brown and without spots before the subterminal line. In the U. S. National Museum there is a specimen labeled "*punctella* Grote, type" (*non descr.*); this specimen is greenish-brown and has two small spots before the subterminal line. These notes give an indication of the variation.

Expanse: 40 mm.

Dates: March.

Distribution: Arizona. The author has one female from McMinnville, Oregon, that was received in a small lot of specimens that had been recently collected and seemingly correctly labeled.

indiscreta Henry Edwards

Phoberia indiscreta Henry Edwards. 1886. Ent. Amer., 2: 170-171.

Type locality: Havilah, Kern Co., Calif. (Stretch). Type: 1 ♀, Amer. Mus. Nat. Hist.

Figure: Maculation: Pl. 1, fig. 5.

A rare but distinct species. The type is a female and so this species has always been placed in the subgenus *Ulosyneda* (species with pectinated antennae) but the author has recently seen some males and finds the antennae clearly not pectinated.

Dates: March.

Distribution: California.

subtermina Smith

Synedoida subtermina Smith. 1900. Proc. U. S. Natl. Mus., 22: 492.

Type locality: San Diego Co., Calif. Type: 2 ♀♀, U. S. Natl. Mus.

This name seems to the author probably a synonym of *indiscreta* Hy. Edw., judging from a superficial examination of the types.

valens Henry Edwards

Synedoida valens Henry Edwards. 1881. Papilio, 1: 119-120.

Type locality: Kanab, Utah. Type: 1 ♂, U. S. Natl. Mus.

Synedoida insperata Grote. 1882. Can. Ent., 14: 176.

Type locality: Arizona. Type: U. S. Natl. Mus.

Figures: Maculation: Pl. 1, fig. 6. Also colored figure of male in Holland's Moth Book (pl. 30, fig. 12). Genitalia: in Richards, 1936c.

This seems to be the commonest species in collections. It is char-

acterized by the complete subterminal line, the absence of the reniform and the black shading beyond the t. p. line. The females are less maculate and have less black suffusion and also the suffusion may be reddish-brown rather than black. This and presumably the following are the only species with pectinated antennae in the male sex (subgenus *Ulosyneda*).

Expanse: 38-45 mm.

Dates: May.

Distribution: Arizona, Utah and Colorado (also recorded as from Wyoming).

Larva: Described by Dyar (Proc. U. S. Natl. Mus., 25: 381-382. 1902).

Food plant: Young oak leaves.

cervina Henry Edwards

Synedoida cervina Henry Edwards. 1882. Papilio, 2: 129.

Type locality: Arizona (coll. by H. K. Morrison). Type: 1 ♀, U. S. Natl. Mus.

This name seems to the author probably a synonym of *valens* Hy. Edw., judging from a superficial examination of the type.

Melipotis Hübner

This is fundamentally a neotropical genus, with only one species limited to North America (*jucunda* Hbn.). Twelve other species are known to extend or stray into the United States, sometimes straying into the northern states or even reaching southern Canada. One species (*indomita* Wlk.) is sometimes a pest on mesquite in the southwest.

Following Hampson's unpublished revision the author listed 40 species in the generic revision (Richards, 1936c). Many more synonymous names are involved. The types are largely in the British Museum and so unavailable to the author. The identifications used herein are from the U. S. National Museum, and hence determined from material named by Dr. Wm. Schaus. The following is not intended as a partial revision of the genus but rather as a presentation of data possibly of use to North American collectors and collections (and so many synonyms unfamiliar to North American literature are omitted).

The names *pallesceus*, *fumosa* and *brunneifasciata*, included in *Melipotis* in the 1917 Check List of Barnes and McDunnough, have been transferred to *Drasteria*.

KEY TO THE SPECIES OF MELIPOTIS RECORDED FROM THE
UNITED STATES

1. Third segment of palpus scarcely or not longer than broad.
(See generic key)
1. Third segment of palpus two or more times as long as broad..... 2
2. Second segment of palpus with tuft of scales below making this segment triangular in outline; fore wing grey, markings mostly obsolete; hind wing white with black border that extends only a little beyond vein 2 (Cu_2) *acontioides*
2. Second segment of palpus smoothly scaled; color not as above..... 3
3. T. p. line produced into long inwardly directed point on vein 2 (Cu_2) 4
3. T. p. line various but never strongly angled in on vein 2, when obsolete ground color brown (not grey) 5
4. Small white orbicular defined by black; all lines complete.
(*Ianius mosca*)
4. No orbicular; lines more or less incomplete *jucunda*
5. Basal half of hind wing white (margin may be dark) 6
5. Hind wing fuscous, darker apically 16
6. T. a. line obsolete or nearly so, t. p. line obsolete except near costa, basal half of fore wing olivaceous (first line across wing is median line) *fasciolaris* ♀
6. T. a. line straight and outwardly oblique or somewhat concave from costa to inner margin 7
6. T. a. line strongly waved, distinctly excurved in both discal and submedian folds 13
7. T. p. line obsolete around postreniform area; subterminal line obsolete except near costa *fasciolaris* ♂
7. T. p. line and subterminal line distinct throughout, occasionally faint but always traceable 8
8. Small white orbicular defined by black; all lines complete.
(*Ianius mosca*)
8. No orbicular 9
9. Fore wing rather uniformly dark grey-brown, the lines slightly darker, without white dash at base of the crescentic reniform; t. p. line rounded around postreniform area and widely separated from the subterminal line *prolata*
9. Fore wing contrastingly colored; more or less distinct light line at base of reniform; t. p. line angled out on vein 6 (M_1) or close to subterminal line 10
10. T. p. line angled back to base of reniform along vein 3 (Cu_1).
contorta ♂

10. T. p. line extending well beyond vein 3 and then abruptly curved back to it or to near it11
11. T. p. a contrasting black line interrupted on veins 3, 4 and 6 (M_1 , M_3 & Cu_1); also t. p. line distinctly angled out on vein 6 (M_1) *indomita*
11. T. p. line not so black, not interrupted, with only faint outward angulation on vein 612
12. Subterminal line defined only by preceding black dashes in costal half of the fore wing *nigrobasis*
12. Subterminal line a light line defined by preceding dark ground color; no black dashes *perpendicularis*
13. Inner margin of hind wing pure white *agrotoides*
13. Inner margin of hind wing fuscous (cilia may be white)14
14. T. p. line angled out on vein 3 (Cu_1) in male; female with markings faint, t. p. line more or less obsolete; no greenish scales in reniform *novanda*
14. T. p. line incurved from vein 4 (M_3) across vein 3; when t. p. line faint in female there are greenish scales in reniform15
15. T. p. line curved back to base of reniform along vein 3; no greenish scales in reniform *contorta* ♀
15. T. p. line extending clearly beyond vein 3 and then curving back to it at base of reniform; greenish scales in reniform. *famelica*
16. T. a. line inwardly oblique from costa to inner margin; hind wing almost uniformly fuscous *cellaris*
16. T. a. line not inwardly oblique, sometimes faint or obsolete17
17. T. p. line angled back to base of reniform along vein 3 (Cu_1); females more or less immaculate *januaris*
17. T. p. extending well beyond vein 3 and then abruptly curved back to it or to near it; females maculate or at least with this recurvation of the t. p. line discernible18
18. T. p. black, interrupted on veins 3, 4 and 6 (M_1 , M_3 & Cu_1). *indomita*
18. T. p. black, brown or obsolete opposite cell but never appearing as a series of black dashes between the veins; females sometimes nearly immaculate *perpendicularis*

acontioides Guenée

Bolina acontioides Guenée. 1852. Spec. Gen. Lepid., 7: 61-62.
Type locality: Unknown to Guenée. Type: Probably in British Museum.

Melipotis sinualis Harvey. 1877. Can. Ent., 9: 94-95.
Type locality: Bosque Co., Texas. Type: British Museum.

Figures: Maculation: Pl. 1, fig. 7. Also a colored figure in Holland's Moth Book (pl. 30, fig. 23). Male genitalia: in Richards, 1936c; one harpé herein, Pl. 6, fig. 1.

This is the only species of *Melipotis* in the new world that has a tuft on the second segment of the palpus making this segment triangular in outline, and also making this species the only New World representative of *Lyncestis* which Hampson classed as a separate genus but which the author placed as a subgenus in his generic revision. The species is equally distinct in general appearance. It varies considerably in size but should be readily recognized from the figures cited. Some specimens show a black suffusion along the inner margin or throughout the fore wing and the author has seen two specimens from Peru with the black margin of the hind wing reduced to about one-third of that figured herein. Sexes alike.

Genitalia: The male genitalia (Pl. 6, fig. 1) are characterized among the species treated in this paper by having well-developed scale pouches at the base of the harpes and a heavy, forked clavus. In the female genitalia the ductus bursae is shorter than the length of segment VIII; the two supporting sclerites of the ductus are both short, the one near the vulva quite short; the bursa is wrinkled and bears many minute micro-trichia which become somewhat larger near the ductus bursae but are not localized into any signum-like patch.

Expanse: 40–50 mm. One dwarf only 32 mm.

Dates: May–November.

Distribution: From Florida and Texas southwards; sometimes straying north as shown by specimens from “Nevada, Iowa” and “Didsbury, Alberta.”

agrotoides Walker

Bolina agrotoides Walker. 1857. Cat. Br. Mus. Het., 13: 1166–1167.

Type locality: Venezuela. Type: British Museum.

Bolina agrotipennis Harvey. 1875. Bull. Buffalo Soc. Nat. Sci., 2: 280.

Type locality: Texas. Type: British Museum.

Figures: Maculation: Pl. 1, figs. 8–9. Male genitalia: Pl. 6, fig. 3.

Another large species characterized by the pure white basal two-thirds of the hind wing including the inner margin. The male has the broad median area contrastingly light and continuous below the reniform with the similarly and evenly colored postreniform area; the whole fore wing is in greys and browns with the terminal area brown. The female has the whole wing lightly colored.

Genitalia: The male genitalia (Pl. 6, fig. 3) are of the same type as those of *acantioides* but have very long scale pouches at the base of the harpes, a slim, unforked clavus, and a heavy spine at the end of the aedaeagus with two more internally. The female genitalia are similar to those of *acantioides* but have a somewhat longer ventral sclerite on the ductus, and the area of the bursa near the ductus is clearly sclerotized.

Expanse: 48–50 mm.

Dates: May.

Distribution: From Texas southward.

novanda Guenée

Bolina novanda Guenée. 1852. Spec. Gen. Lepid., 7: 64.

Type locality: Colombia. Types: Probably in British Museum.

Figures: Maculation: Pl. 1, figs. 10–11. Male genitalia: Pl. 6, fig. 2.

Very similar to *agrotoides* Wlk. from which it is most readily separated by the slight fuscous strip along the inner margin of the hind wing. Also in the male the median area is less or not continuous with the postreniform area; veins 3 and 4 (M_3 & Cu_1) are streaked with white; the fore wing is more bluish-grey with black and the terminal area distinctly bluish-grey. The female resembles that of *agrotoides* but is darker, more nearly immaculate and more bluish.

Genitalia: The male genitalia (Pl. 6, fig. 2) are quite similar to those of *agrotoides* but the scale pouches at the base of the harpes are much shorter and there are no heavy teeth on the vesica. The female genitalia are also similar to those of *agrotoides* but the sclerites of the ductus bursae are longer and the bursa is membranous throughout.

Expanse: 40–50 mm.

Distribution: Previously recorded only from the neotropics. The Barnes Collection (U. S. Natl. Mus.) has eleven specimens from southern Arizona and one from Boulder, Colorado. Also Mr. S. E. Crumb has recently bred the species.

Food plant: Cat Claw (*Acacia* sp.) (teste S. E. Crumb).

contorta Guenée

Bolina contorta Guenée. 1852. Spec. Gen. Lepid., 7: 64–65.

Type locality: Il St. Thomas. Type: Probably in British Museum.

Figures: Maculation: Pl. 1, figs. 12-13. Male genitalia: Pl. 6, fig. 4.

A large species, predominantly brown with more or less black suffusion, especially in the male. In the male the t.a. line is straight and oblique, in the female waved. This species is nearest *famelica* from which it may be separated by the brown color of thorax and wings, the absence of greenish scales in the reniform, the course of the t. p. line which is much more produced on vein 4 (M_3) than 6 (M_1) and which curves back to the base of the reniform along vein 3 (Cu_1), and by the complete subterminal line.

Genitalia: The male genitalia (Pl. 6, fig. 4) are of the same general type as those of *acontioides* but (like the following three species) lack the definite scale pouch and have only flat or slightly swollen areas for these scale tufts; clavus heavy and with small distal prong, and the clasper arises very near the clavus. The female genitalia are similar to those of *acontioides* but the two supporting sclerites of the ductus bursae are of approximately equal size, the one near the vulva very slightly larger.

Expanse: 45-55 mm.

Distribution: Southern Florida (Richards, 1937) and southwards.

famelica Guenée

Bolina famelica Guenée. 1852. Spec. Gen. Lepid., 7: 62.

Type locality: Campeche, Mexico. Type: Probably in British Museum.

Figures: Maculation: Pl. 1, figs. 17-18. Male genitalia: Pl. 6, fig. 5.

A moderately large species usually distinguished by the mottling of grey and brown and by the greenish scales in the reniform. In addition it is distinguished from *contorta* by the t. a. line being waved in both sexes, the grey ground color of thorax and wings, the course of the t. p. line which is scarcely more produced at vein 4 than at vein 6 and which extends well beyond vein 3 and then curves back to it at the base of the reniform, and by the subterminal line becoming weak or obsolete towards the inner margin.

Genitalia: The male genitalia (Pl. 6, fig. 5) are very close to those of *contorta* but the clavus is single (without distal prong). The female genitalia are too close to those of *contorta* to make brief notes possible.

Expanse: 40-45 mm.

Dates: March.

Distribution: From southern Florida and Mexico southwards.

prolata Walker

Gerespa prolata Walker. 1857. Cat. Br. Mus., Het., 13: 1169.

Type locality: Jamaica. Type: British Museum.

Figures: Maculation: Pl. 1, fig. 14. Male genitalia: Pl. 6, fig. 6.

A distinct species which in general appearance reminds one of certain unrelated European species (*Aedia sericea*, *alchymista*, etc.), an appearance that is aided by the relatively broad rounded wings of this species. The body, fore wings and outer half and margins of the hind wings are a dark grey-brown. The black t. p. line bends in around the end of the cell but is widely separated from the jagged subterminal line which is defined on its inner side by some black scales. The base of the hind wing, except the margins, is pure white as are also the cilia at the apex and inner angle.

Genitalia: The male genitalia (Pl. 6, fig. 6) are of the same type as the preceding but the clavus is longer and definitely forked near the tip. The female genitalia are also similar to the previous species but the ductus bursae is somewhat longer and the sclerite nearer the vulva is definitely the longer one.

Expanse: 32-35 mm.

Distribution: Southern Florida (Richards, 1937) and southwards.

jucunda Hübner

Melipotis jucunda Hübner. 1818. Zutr. exot. Schm., f. 81.

Type locality: Georgia. Type: Lost but figured.

Bolina cinis Guenée. 1852. Spec. Gen. Lepid., 7: 62.

Type locality: North America. Type: Probably in British Museum.

Melipotis jucunda var. *versabilis* Harvey. 1877. Can. Ent., 9: 94.

Type locality: Alabama. Type: British Museum.

jucunda race *hadeniformis* Behr

Bolina hadeniformis Behr. 1870. Trans. Amer. Ent. Soc., 3: 25.

Type locality: California. Type: Destroyed.

Cirrhobolina tetrica Henry Edwards. 1878. Pac. Coast Lepid., no. 29, p. 10.

Type locality: California. Type: 1 ♀ at Amer. Mus. Nat. Hist.

Figures: Maculation: Pl. 1, figs. 19-20. Also colored figures by Hübner and in Holland's Moth Book (pl. 30, fig. 24). Genitalia:

Male: Pl. 6, figs. 7 & 14; both male and female figured in generic revision (Richards, 1936c).

This, the only species limited to North America, has no relatives that are likely to cause confusion. The sexes are different, the females being largely immaculate though the inward angulation of the t. p. line on vein 2 (Cu_1) seems always discernible. The males vary greatly in the degree of maculation of the fore wings, development of a contrasting median area and amount of brown.

The synonymy as given here was discussed in the generic revision (Richards, 1936c, footnote on p. 354). The author is somewhat dubious of the value of a separate racial name for the Pacific coast specimens though in series they do appear somewhat different.

Genitalia: The male genitalia (Pl. 6, figs. 7 & 14; and in Richards, 1936c) are characterized by having the clasper divided into two wholly separate pieces. The female genitalia (figured in Richards, 1936c) are characterized by the short ductus bursae with a characteristically shaped dorsal sclerite near the vulva.

Expanse: 35-47 mm.

Dates: April-October in the south; May-June in the north.

Distribution: New York to southern Florida and west to Texas, California, Idaho and British Columbia, and extending southwards as far as central Mexico.

Food plant: *Salix bonplandia*, *S. wrightii* and *Acacia* sp. (teste S. E. Crumb).

indomita Walker

Bolina indomita Walker. 1857. Cat. Br. Mus., Het., 13: 1161.

Type locality: Brazil. Type: British Museum.

Aedia nigrescens Grote & Robinson. 1866. Proc. Ent. Soc. Phil., 6: 20-21, pl. 3, fig. 4.

Type locality: Texas. Type: 1 ♀ at Phil. Acad. Nat. Sci.

Bolina ochreipennis Harvey. 1875. Bull. Buffalo Soc. Nat., Sci., 3: 12, fig. 10.

Type locality: Texas. Type: 1 ♂ at British Museum.

Melipotis ochreifascia Grote, non descr. (lapsus typogr. for *ochreipennis* Harvey) 1875. Trans. Amer. Ent. Soc., 5: 117.

Melipotis flavipennis Grote, non descr. (lapsus typogr. for *ochreipennis* Harvey) 1883. Can. Ent., 15: 5.

Figures: Maculation: Pl. 1, figs. 21-22. Also the female figured by Grote & Robinson, and the male by Harvey in their descriptions. Male genitalia: Pl. 6, fig. 8.

This well-known sexually dimorphic species is a pest on mesquite in parts of the southwest. The straight oblique t. a. line, the black t. p. line interrupted on veins 3, 4 and 6, and the cream, dusky or fuscous base of the hind wing are ample for separation from other North American species.

Genitalia: The male genitalia (Pl. 6, fig. 8) are readily recognized by the bifurcate clavus, the long clasper located far out on the harpé, and the vesica with only small spines. The harpé is membranous with an irregular, somewhat folded margin. This and all the following species lack the membranous area bearing long scales at the base of the harpés. The female genitalia have the ductus bursae longer than segment VIII; both of the supporting sclerites long, the dorsal one longer and dilated near the vulva; the bursa is minutely spined but without signum-like patches.

Expanse: 40–55 mm.

Dates: May–July.

Distribution: Texas and Arizona and southwards, straying east to Georgia and north to Colorado, Delaware and New York.

Larva: Described by Dyar (Bull. Brook. Inst. Arts & Sci., 1: 201. 1906) and again by Brisley (Pan-Pacific Ent., 1: 94. 1924.).

Food plant: Mesquite (*Prosopis glandulosa*).

fasciolaris Hübner

Aedia fasciolaris Hübner. 1825. Zutr. exot. Schm., 3: 15, f. 443.

Type locality: Bahia, Brazil. Type: Lost but figured.

Bolina cunearis Guenée. 1852. Spec. Gen. Lepid., 7: 70.

Type locality: Cuba. Type: Probably in British Museum.

Figures: Maculation: Pl. 1, figs. 23–24. Also colored figure in Hübner's original description, and colored figure of female in Holland's Moth Book (pl. 30, fig. 22). Male genitalia: Pl. 6, fig. 9.

The sexes of this species are greatly different and likely to be taken for two species. In the male the thorax, the base of the fore wing to the t. a. line, the triangular space between the median line and the reniform and the costa to the subterminal line are dark red-brown with some black; the t. a. line is straight and oblique; the median light area narrow, and the t. p. and subterminal lines obsolete from a little below the costa. In the female the t. a. line is absent or almost so, and the thorax and base of the wing to the oblique median line is olivaceous; the apical part of the fore wing is reddish-brown with the pattern vague. In both sexes there is a heavy fuscous border to the hind wing, preceded by pure white, the base being fuscous.

Genitalia: The male genitalia (Pl. 6, fig. 9) are similar to those of *indomita* but the clavus is not forked though it does have a small distal lobe, and the vesica has heavier spines plus one long curved spine over half as long as the aedaeagus (Pl. 6, fig. 9a). In the female genitalia the ductus bursae is much longer than segment VIII; the supporting sclerites both long, the ventral one much longer (longer than segment VIII) and somewhat dilated near the vulva; bursa minutely spined.

Expanse: 35–48 mm.

Distribution: Florida, Texas and Arizona and southwards; sometimes straying north (recorded by Latham from Orient, Long Island. Bull. Brook. Ent. Soc., 28: 198. 1933).

perpendicularis Guenée

Bolina perpendicularis Guenée. 1852. Spec. Gen. Lepid., 7: 65–66.

Type locality: Colombia. Type: Probably in British Museum.

Melipotis stygialis Grote. 1878. Bull. Geol. Survey, 4: 184.

Type locality: "Illinois." Type: Unknown to author.

Figures: Maculation: Pl. 1, figs. 26–28. Male genitalia: Pl. 6, fig. 10.

The males are readily separated by the broad, oblique, more or less ruddy median area and the solid black t. p. line which extends well beyond vein 3 (Cu_1) and then curves back to it at the base of the reniform. The females are very variable and immaculate ones difficult to separate from immaculate females of *januaris* except by the larger size; when the t. p. line can be traced they may be separated readily.

The name *stygialis* Grote, still an unplaced name in American check lists, stands as a synonym under *perpendicularis* in the neotropical collection at the U. S. National Museum. A colored figure of the type of *stygialis* in the Barnes Collection (U. S. N. M.) confirms this placement, and shows the type of *stygialis* to have been a large, rather poorly marked female of this species.

Genitalia: The male genitalia (Pl. 6, fig. 10) are of the same type as the preceding two species, and are separated from *indomita* most easily by the heavier spines on the vesica, and from *fasciolaris* by the bifurcated clavus and lack of a long spine in the aedaeagus. The female genitalia (figured in Richards, 1936c) have a long ductus bursae, and the bursa definitely wrinkled and with a large, band-like signum-like patch of microtrichia almost surrounding the opening of the ductus into the bursa.

Expanse: 40–50 mm.

Distribution: Throughout the neotropics with scattered records from Texas, Arizona and southern Florida (Richards, 1937). Grote's type of *stygalis* was supposed to have been caught in Illinois.

cellaris Guenée

Bolina cellaris Guenée. 1852. Spec. Gen. Lepid., 7: 66.

Type locality: Colombia. Type: Probably in British Museum.

= *Panula inconstans* of Grote and subsequent North American lists but not of Guenée.

Figures: Maculation: Pl. 1, fig. 25. Also colored figure in Holland's Moth Book (pl. 30, fig. 21) under name of "*Panula inconstans*." Male genitalia: Pl. 6, fig. 11; entire male genitalia figured in Richards, 1936c.

A lightly built species readily separated by the fuscous hind wing, the straight t. a. line which is slightly oblique inwardly from the costa to the inner margin, and the t. p. line which is incurved in the submedian fold. Sexes alike.

Genitalia: The male genitalia (Pl. 6, fig. 11; and in Richards, 1936c) are characterized by the narrow, curved tegumen, the very slim and long clavus, and the divided clasper that extends far out on the harpé, the exact distance varying somewhat. There is also a moderate sized spine inside the aedaeagus, about one-third the length of that in the aedaeagus of *fasciolaris* relatively. The female genitalia are similar to those of *perpendicularis* but the signum-like patch in the bursa is a short, straight band on one side; the bursa wrinkled and with microtrichia.

Expanse: 35–40 mm.

Dates: February, June and September.

Distribution: Arkansas to Texas and southwards (Richards, 1937).

nigrobasis Guenée

Bolina nigrobasis Guenée. 1852. Spec. Gen. Lepid., 7: 65, pl. 13, fig. 8.

Type locality: Mexico. Type: Probably in British Museum.

Figures: Maculation: Pl. 1, figs. 29–30. Also colored figure in original description. Male genitalia: Pl. 6, fig. 12.

A distinctive species that cannot be confused with anything else recorded from the United States. The fore wing is brown overlain with black scales; the black dashes in the costal half of the fore wing beyond the t. p. line are distinctive.

Genitalia: The male genitalia (Pl. 6, fig. 12) are similar to those of *cellaris* but the clavus is much heavier and swollen just before the tip (rudimentary prong ?). The female genitalia are also similar to those of *cellaris* but the bursa is smooth and without microtrichia.

Expanse: 35–38 mm.

Distribution: Previously recorded only from the neotropics. The U. S. National Museum has a short series from Brownsville, Texas (February, May, July and August, collected by Geo. Dorner) and from San Benito, Texas (March, July and August).

januaris Guenée

Bolina januaris Guenée. 1852. Spec. Gen. Lepid., 7: 67.

Type locality: Haiti. Type: Probably in British Museum.

Figures: Maculation: Pl. 1, figs. 15–16. Male genitalia: Pl. 6, fig. 13.

This is a very variable species. Normally the males are well marked and the females poorly marked, but some males are very lightly marked and some females rather well marked. Also, some females show a dark patch on the costa between the t. p. and sub-terminal lines, the rest of the wings being lighter (compare females of *perpendicularis*). The fuscous hind wing leaves no room for confusion except with *perpendicularis* from which it is readily separated by the t. p. line when that line is discernible, when in females that line can not be traced size is about the best character.

Genitalia: The male genitalia (Pl. 6, fig. 13) have a narrow curved tegumen and may be readily recognized from the drawings but are best characterized by being the only species of *Melipotis* treated herein which has the juxta covered with small teeth laterally. Also there are three lobes at the base of the harpé, two seemingly the clavus with a basal lobe, the third a prong from the basal end of the line of chitinization that leads out to the elasper (but this line to the clasper usually begins at the base of what is called here the clavus). The female genitalia have the ductus bursae about as long as segment VIII, the two supporting sclerites of about equal length; the bursa minutely spined but without signum-like patches.

Expanse: 32–42 mm.

Dates: May–July.

Distribution: From southern Florida southwards (Richards, 1937).

Panula Guenée

The author has already pointed out above and in a previous paper (Richards, 1937) that the *Panula inconstans* of Grote, Hol-

land, Barnes and McDunnough Check List, etc., is *Melipotis cellaris* Guenée (as was pointed out by Butler in 1892). So far as is known true *P. inconstans* does not occur or stray north to the United States. It resembles a small species of *Melipotis* in appearance from which it differs in palpi and genitalia. It may also be separated by the *uniform* brown color of the hind wing and lower surfaces (see Pl. 1, fig. 31).

Panula scindens Walker has been recorded from the United States by Barnes & Benjamin (Proc. Ent. Soc. Wash., 28: 19-20. 1926) but, as they suggested, does not belong in this genus. Recently the author has examined this species and the male and female genitalia at the U. S. National Museum and agrees with Barnes & Benjamin in removing it to the *Isogona* group where for the present at least it may be placed in the genus *Isogona* itself.

Ianius, gen. nov.

Proboscis fully developed; palpi obliquely ascending, first segment fringed below, second segment reaching middle of frons, third segment erect or almost so and almost three times as long as broad; frons protruding and slightly roughened, not tufted; antennae simple and ciliated in both sexes; femora fringed with long scales; tibiae heavily scaled, not spined, middle tibiae of male swollen and enclosing a tuft of long scales; fore wing with orbicular spot present; thoracic vestiture scaly, slight metathoracic tuft; abdomen smoothly scaled; venation as in *Melipotis*.

Genitalia: Male (Pl. 6, fig. 16): uncus long and cygnated; base of sacculus with heavy row of macrosetae; sacculus rudimentary distally. Female (Pl. 6, fig. 15): sternite VIII a single band-like sclerite.

Genotype and sole species: *Melipotis mosca* Dyar.

This species was described in the genus *Melipotis* but looks rather out of place wherever put. With *Forsebia perlaeta* and *Asyneda mendozina* it occupies an anomalous position between *Phoberia-Litocala-Cissusa-Melipotis* and *Drasteria-Leucanitis*. These three species have much in common and yet are quite different from one another as comparison of the above generic diagnosis with the original descriptions of *Forsebia* and *Asyneda* will show (Richards, 1936a). They all agree with *Drasteria* and differ from *Melipotis* in the very characteristic shape of the uncus and the presence of heavy macrosetae at the base of the sacculus, and agree with *Melipotis* and differ from *Drasteria* in habitus and in having the sacculus rudimentary

distally. The author would not be inclined to place much reliance in the above characters were it not for two facts: (1) These characters hold universally in this group of genera named above, and, excepting these three species above mentioned, divide the group into two clear-cut subgroups (plus the anomalous *Panula* and *Bulia* and the doubtfully included *Boryza*, *Boryzops* and *Lois*). (2) These three species are all of somewhat anomalous appearance and no one of them so far as the author knows has any close relatives in either *Melipotis* or *Drasteria*.

The author's first impression on examining the genitalia of *mosca* was to include it in the subgenus *Asyneda* of *Forsebia*, but there are so many differences between these three species that despite the similarities it seems necessary to use separate generic names.

Named after the author's son who is too young either to approve or object.

mosca Dyar

Melipotis mosca Dyar. 1911. Proc. U. S. Natl. Mus., 38: 253.

Type locality: Mexico City, Mexico (Sept.-Nov., R. Müller). Types: 1 ♂, 4 ♀, U. S. National Museum.

Figures: Maculation: Pl. 1, fig. 35. Genitalia: Male: Pl. 6, fig. 16; female: pl. 6, fig. 15.

This species is readily recognized from the figure. It looks like a peculiar species of *Melipotis* but may be distinguished from all other species of the *Melipotis-Drasteria* group by the presence of a definite orbicular spot (white outlined by black). Sexes similar but median area lighter and brighter in the male.

Genitalia: The male genitalia (Pl. 6, fig. 16) are more or less intermediate between those of *perlaeta* and *mendozina*; sacculus with heavy row of setae at base, rudimentary beyond clasper; clavus bifurcated with long basal lobe; vinculum long; aedaeagus with ridges poorly developed, one ending in a recurved point, the other almost straight (not serrated). The female genitalia (Pl. 6, fig. 15) are similar to those of *mendozina* but differ in that sternite VIII is a single narrow sclerite and that the bursa is smooth (unspined) near the entrance of the ductus bursae and has only minute microtrichiae over the remainder of the surface.

Expanse: 35-40 mm.

Distribution: Previously recorded only from the neotropics. The U. S. National Museum has a series of 18 perfect specimens (ex Barnes Collection) collected at Alpine, Texas in April, May, June and July, 1926, by O. C. Poling (called to the author's attention by

Mr. J. F. Gates Clarke to whom thanks are due for permission to incorporate the records here).

Asyneda Richards

mendozina Hampson

Syneda mendozina Hampson. 1926. Lepid. Phal. N. G. & Spec. Noct., p. 44.

Type locality: Mendoza, Argentina. Types: ♂ & ♀, British Museum.

Figures: Maculation: Pl. 1, fig. 34. Genitalia: Male and female genitalia figured in Richards, 1936a.

Distribution: Mendoza and La Rioja, Argentina. Included here for comparison of photograph with other species. Sexually dimorphic; females with reduced maculation.

Forsebia Richards

perlaeta Henry Edwards

Melipotis perlaeta Henry Edwards. 1882. Papilio, 2: 14.

Type locality: Prescott, Arizona. Types: ♂, U. S. National Museum.

Synedoida aegrotata Henry Edwards. 1884. Papilio, 4: 47.

Type locality: Arizona. Types: 1 ♂, 1 ♀, U. S. National Museum.

Syneda flavofasciata Streecker. 1898. Lepid. Rhop. Heter., Suppl. 1, p. 12.

Type locality: Arizona. Types: 1 ♂, Field Museum (Chicago).

Figures: Maculation: Pl. 1, figs. 32-33. Also colored figure of female in Holland's Moth Book as a species of *Melipotis* (Pl. 30, fig. 26). Genitalia: Male and female genitalia figured in Richards, 1936a.

The figures are ample for determination of this sexually dimorphic species, especially in combination with the spined fore tibiae.

Distribution: Texas, Arizona and California.

Drasteria Hübner

In the generic revision (Richards, 1936c) the lengthy reasons why the author groups all these species together instead of splitting into two or more genera on a basis of the presence or absence of spines at the tip of the fore tibiae are given in detail.

In his new Check List McDunnough largely follows the rearrangement of the North American species suggested in the generic

revision by the present author, but the present author cannot agree to his use of the generic name *Synedoida*. To understand the situation one must remember that the name *Syneda* must be dropped (same genotype as *Drasteria*), and also hold in mind two tendencies of Dr. McDunnough: (1) that he likes small genera, many genera and no subgenera, and (2) that whenever possible he will hold that the nearctic species of any group are not congeneric with the palearctic species of the same group. This leads to a dilemma in this group; for with the name *Syneda* unavailable and with none of the palearctic names acceptable to Dr. McDunnough, there are only two names available for the North American species and the genotypes of both have spined fore tibiae (unless more generic names are to be proposed, which McDunnough has not seen fit to do). The genotypes of these two names, despite the spined fore tibiae are not closely related but are in fact each closely related to a different group of unspined species. McDunnough tries to circumvent these facts by using *Drasteria* in the old restricted sense, and *Synedoida*¹ for its spined genotype (*scrupulosa*) and all the unspined species. It is true that *Synedoida scrupulosa* is very close to some of the unspined species (*inepta*, *sabulosa*), but the catch comes in the fact that *Drasteria mirifica* is even more closely related to what McDunnough calls "*Synedoida*" *howlandi* and *tejonica* (*perfecta*). Such inconsistency cannot be accepted by the present author.

There seems to the present author to be three ways that would be more satisfactory. Either make all possible genera: this would mean restricting *Drasteria* to *graphica*, *occulta*, *ingeniculata*, *mirifica* and *eubapta*, restricting *Synedoida* to the single species *scrupulosa*, and erecting several new generic terms (one for *inepta*, one for *grandirena*, and at least one for the remaining unspined species). Or, the second alternative and the one followed by the author in his generic revision, group all these species into one genus and recognize three subgenera and a number of unnamed species groups: *Drasteria* and *Synedoida* for the spined species and *Aleucanitis* (accepting the palearctic name²) for the unspined species. The type of *Aleucanitis* (*cailino* Lef., pl. 5, fig. 15) is structurally similar to our peculiar species *grandirena* (*limbolaris*) and except for its smooth flat front

¹ Incidentally McDunnough cites *Bolina* Dup. as a homonomous name under *Synedoida*, seemingly overlooking the fact that it has the same genotype as *Aleucanitis* Warren which he refuses to accept because palearctic.

² For convenience of comparison a few photographs of palearctic species have been included. See pl. 5, figs. 15-18.

also seems congeneric with other nearctic species (*pallescens*, *hudsonica*, etc.). Or, a third alternative conforming to the grouping of species given herein, use the name *Synedoida* (as of either generic or subgeneric rank) for the first species group including the spined genotype *scrupulosa* and the unspined but otherwise closely related *inepta*, *sabulosa*, *ochracea* and *biformata* and include with these or make a separate group for *pallescens*, *fumosa*, *divergens* and *edwardsi*; use *Aleucanitis* for the single North American species *grandirena*, and use *Drasteria* for the unspined *hudsonica*, *petricola*, *perplexa*, *adumbrata*, *stretchii*, *pulchra*, *howlandi* and *tejonica* and for the spined but closely related *mirifica*, *eubapta*, *graphica*, *occulta* and *ingeniculata*. Any of these alternatives allows an arrangement of the species which in so far as linear tabulation permits will show both relationships and differences without doing injustice to either. (See below under "Species groups in *Drasteria*.")

There are two groups of species as yet not satisfactorily "speciated." In the first of these (*sabulosa-abrupta-nichollae*) very little material is available except for Colorado specimens of *sabulosa sabulosa*, and wide gaps exist between the points of collection outside of Colorado. In the second case (*howlandi* versus *tejonica*) long series are available for study but still no convincing arrangement has been made (see under *howlandi*). To this list one might add in a lesser sense: *mirifica* versus *eubapta* and *graphica atlantica* versus *occulta*.

The other species seem understandable. Races, when such occur, are usually not clear-cut and variation is considerable. There is a strong temptation to describe distinct looking forms known only from one section, locality or collection lot. In the past this has accounted for a considerable portion of our present synonymy. In this category are included the dark grey specimens of *inepta* collected around Logan, Utah (no other form occurring there when the author collected in 1933); the somewhat larger and darker specimens of *ochracea* found in the northern part of its range (note that most of the variation in this respect is sexual); the darker, almost melanic form of *edwardsi* that is commoner in the northern part of the range of this species although rarely occurring in the southern part; the yellow hind-winged form of *howlandi* known to the author only from two specimens from Montana, etc. None of these are described herein (nor other forms that seem surely individual variants) partly because of what seems to me inadequate material but largely because the variation in this genus is so complex that such names would seem to have little value unless based on a large amount of carefully analyzed ecological data or on genetic analyses corre-

lated with field data. Needless to add neither of the above is available.

In at least two species there seem to be good races occupying the same regions but different habitats. The surer of these is the case of the plains versus mountain race of *hudsonica*. The less sure one is *divergens* versus *socia*, the suggestion being based on the two being seldom taken together. There is unsatisfactory evidence that similar races may occur in certain other species. Then, of course, there is the case of northern versus southern races of *graphica* (female maculate versus immaculate).

It should be noted that there is a great range of intraspecific variability in the genital armature of the various species. The brief notes under each species are necessarily somewhat indefinite because of this considerable range of variation. For instance, in the males of some species the clasper of the left harpé is bifurcated. In some (*adumbrata*, *pallescens* and *edwardsi*) this is a constant character though the size of the clasper and its two parts varies; in another species (*perplexa*) the left clasper is usually single but occasionally has a rudimentary costal piece; in still others (*stretchii* and *mirifica*) this clasper is usually bifurcated but some specimens show the costal piece rudimentary or even absent (similar variation occurs in *pulchra* and possibly in *eubapta* but too few slides are available to say which is usual). The other genitalic characters of the male also show wide intraspecific variation but with the exception of *occulta*, *eubapta*, *tejonica* and *nichollae* the genitalia of each species seem always separable from those of related species. Some of these variations may be seen by comparing the figures herein.

In this connection it might be well to note that the most difficult character to determine is whether or not a patch of spines is present on the aedaeagus near the tip. There is really a graded series from spines on a chitinized hump or swelling (*perplexa*, *adumbrata* and *stretchii*) to spines on a normally chitinized aedaeagus (*inepta*, *biformata*, *sabulosa*, *scrupulosa* and *ochracea*), to species in which there are some small spines on a membranous area in this region which becomes continuous with the spined vesica (*hudsonica* and especially *howlandi* and *tejonica*).

The author would like to call attention to the necessity of a uniform method of mounting male genitalia in this genus. Slight differences in the degree of spreading of the harpes make considerable differences in the appearance of the characters. This is well shown by plate 8, figures 1 and 2 (*adumbrata* race *alleni*) which are almost identical genitalia but which at first glance appear widely different

due to the manner of arranging the harpes. On the whole it seems to the author best to remove the aedaeagus and spread the valves wide and flat, obtaining a considerable distortion of the vinculum and juxta and a seeming reduction of the basal shelf-like projection of the sacculus but showing clearly the clavus. Whatever may be the best method of mounting these genitalia, one must take the position of the harpes into consideration in using the figures given in this paper and in comparing different slides.

The female genitalia present few characters for specific differentiation. The principal ones mentioned under each species are the two sclerites supporting the ductus bursae. These two are (1) a sclerite near the bursa copulatrix which is located on the dorsal side of the ductus bursae and extends down the lateral sides of the ductus and usually more or less across the ventral surface, particularly from the left side. This sclerite near the bursa is herein referred to as the "dorsal sclerite." (2) A sclerite located on the ventral side of the ductus near the opening of the same to the outside and separated from the preceding sclerite by an area of membrane. This second sclerite is herein referred to as the "ventral sclerite."

The female genitalia, like the male genitalia, vary greatly in these differential characters (see figures, Pl. 11, figs. 1-5). Frequently satisfactory characters for identifying slides of the female genitalia are lacking in this genus.

SPECIES-GROUPS IN *DRASTERIA*

The North American species seem to fit most naturally into three groups though some may not approve such listing because two of the groups contain species both with and without spines (macrosetae) at the tip of the fore tibiae. No key to these groups can be given readily but considering all characters including genitalia and habitus the species seem best arranged in the following manner (within the limits of linear arrangement). Group I. (Subgenus *Synedoida*, type *scrupulosa*) Includes: (1) *scrupulosa*, *inepta*, *sabulosa* (and *abrupta*), *nichollae* (& *garthi*), *biformata*, *ochracea*, (2) *edwardsi*, (3) *pallascens*, *fumosa* (& *brunneifasciata*) and *divergens* (& *socia*).

Scrupulosa has the unbanded hind-wing and genitalia of the type shown by *inepta-sabulosa*: claspers of the male genitalia reduced, obsolete on the right harpé, sacculus reduced basally, greatly developed apically, aedaeagus spined on the dorsal side near the tip, but the male antennae are shortly ciliated and the fore tibiae, unlike all others of this group, are armed with spines (macrosetae) at the tip. *Inepta* has the markings of the fore wing obsolescent, male genitalia

with small claspers and not so greatly developed apical parts of the sacculus, but the aedaeagus is spined dorsally at the tip and the male antennae are somewhat fasciculate and slightly serrated and the middle tibiae of the male (unlike all other species of this genus) are normal and without an enclosed tuft of sex-scales. *Sabulosa* (& *abrupta*) has a well-marked fore wing, male genitalia with claspers and sacculus reduced and aedaeagus spined on the dorsal side near the tip; male antennae not serrate and with somewhat shorter cilia than *inepta*; the middle tibiae of the male are swollen and enclose a moderate tuft of sex-scales. *Biformata* has the hind wing unbanded, male genitalia of more normal looking type with claspers and sacculus moderately developed and aedaeagus with patch of spines on the dorsal side near the tip; male antennae ciliated about as in *sabulosa*. *Ochracea* is a distinctive species with reduced maculation of the fore wing but unlike the preceding species has clearly banded hind wings; male genitalia with reduced claspers (obsolete on left harpé), moderate sacculus, peculiar heavy uncus and spined aedaeagus. The above species agree in having distinct spines on a strongly sclerotized aedaeagus, usually a reduction of the claspers of the male genitalia, and all except *ochracea* having unbanded hind wings.

Edwardsi is a distinctive species not closely similar to any other in either the new or old world. It has distinct maculation and banded hind wings; claspers well developed, bifurcated on left harpé, sacculus moderate, left harpé of unique shape and aedaeagus without external spines. *Edwardsi* is placed here because of the similarity of the male genitalia to those of *pallescens* but whatever placement is given this species at present would have to be admittedly arbitrary.

Pallescens has a white hind wing which is dark fuscous or black in the outer half or less (though the males show a reduced banding); claspers well-developed, bifurcated on left harpé, sacculus moderate, clavus long, especially on right harpé, and aedaeagus without external spines; female genitalia with the ventral sclerite moderate. This species is clearly related to both the *sabulosa* group and to *fumosa* though having its own peculiarities. *Fumosa* agrees with the preceding in maculation, especially of the hind wing, and also is similar to *sabulosa abrupta*; male genitalia with long single claspers, clavus and sacculus moderate, and aedaeagus without external spines; the female genitalia are intermediate in type between those of *pallescens* and *divergens* and serve to link the latter here. *Divergens* (& *socia*) are structurally more related to the above than to

the other species with yellow and black banded hind wings (Group III).

Group II. (Subgenus *Aleucanitis*, type *cailino* Lef. of Europe). From the North American species the author places in this group only the single peculiar species *grandirena* (*limbolaris*) which differs from other nearctic species in maculation and in having a smooth flat front; male antennae minutely ciliated and male genitalia with a swollen uncus. On the whole this species seems to resemble the European representatives of the *cailino-obscurata* group rather than anything in the New World (see Pl. 5, figs. 15-18), but the markings of the lower surfaces of *grandirena* might be used as an argument for closer affinity to *graphica*, etc.

Group III. (Subgenus *Drasteria*, type *graphica*). Includes: *petricola* (and *athabasca*), *hudsonica* (and its races), *perplexa*, *adumbrata* (and *alleni*), *stretchii*, *pulchra*, *howlandi*, *tejonica*, *mirifica* (and its races), *eubapta*, *graphica* (and *atlantica*), *occulta*, and *ingeniculata*.

Petricola (and race *athabasca* and form *crockeri*) is the only species in which the veins on the underside of the fore wing in the terminal area are streaked with black. The male genitalia are somewhat reduced and heavily chitinized, claspers small and single, sacculus rudimentary basally on right harpé and basal lobes of the clavus very small (in last two characters agreeing with *sabulosa*, etc.).

Hudsonica and its races (presumably including the names *nubicola* and *maculosa*) are northern and fairly high altitude forms with one race occurring in the northern plains. The male genitalia are normal with single claspers, moderate sacculus the basal half of which is recurved in outline, and aedaeagus with minute, scarcely discernible points on the dorsal side near the tip.

The next eight species form a beautiful series beginning with *perplexa* and *adumbrata* in which the aedaeagus has a large dorsal hump covered with heavy spines, through *stretchii* which has the pattern of *adumbrata* and the color of *howlandi* and a spined swelling rather than hump on the aedaeagus, through *pulchra* which has the facies of *howlandi* and *tejonica* and an unswollen but spined aedaeagus to *howlandi* and *tejonica* which have a smooth aedaeagus with scarcely discernible points on the dorsal side near the tip, to *mirifica* and *eubapta* which seem to lack these spines or points on the aedaeagus but otherwise to be very similar. Other differences may of course be seen by studying the genitalic figures, some of them such as the bifurcation of the claspers not following the above se-

quence. Also note that in passing from *tejonica* to *mirifica* one passes from species with unspined fore tibiae to ones with spines (macrosetae) at the tip. The genitalic and habitus similarity seem to this author to force including the above all in one sequence despite the cropping up of spined tibiae.

Somewhat distinct from the above are the other three species with spined fore tibiae: *graphica* (and race *atlantica*), *occulta* and *ingeniculata*. These agree in the female possessing a short ovipositor and a large ventral sclerite on the ductus bursae. The male genitalia of *graphica* and *occulta* have short blunt harpés, while those of *ingeniculata* are long and rounded.

KEY TO THE SPECIES OF DRASTERIA OF NORTH AMERICA

1. Fore tibiae unspined 2.
1. Fore tibiae with spines (macrosetae) on the outer and inner sides of apex 32.
2. Hind wing white in basal half, dark fuscous or black in outer half (sometimes much less than half) except for cilia and median white lunule; subterminal line not sharply angled in opposite cell 3.
2. Hind wing fuscous, creamy, pinkish or dirty white, darker outwardly; when whitish at base subterminal line sharply angled in opposite cell 5.
2. Hind wing of various colors but always with distinct postmedian and terminal bands or spots and usually with distinct discal spot 11.
3. Thorax and base of fore wing pinkish-grey, contrasting with abdomen and rest of wing *pallescens*.
3. Thorax and fore wing mottled gray 4.
4. Cilia distinctly checkered on fore wing *fumosa fumosa*.
4. Cilia of fore wing uniform smoky *fumosa brunneifasciata*.
5. T. a. and t. p. lines obsolete or almost so throughout most of their course *inepta*.
5. T. a. and t. p. line black, distinct throughout 6.
6. T. a. line outwardly oblique from costa to beyond cell, then incurved across anal vein; terminal line absent; underside without dark bands *biformata*.
6. T. a. line excurved in discal and submedian folds or evenly excurved from costa to inner margin; terminal line faint but present; undersides particularly of fore wings with dark bands (sometimes rather faint) 7.

7. Thorax and base of fore wing pinkish-grey, contrasting with abdomen and rest of wing *pallescent* (part).
7. Thorax and base of fore wing not contrasting pinkish-grey 8.
8. Subterminal line obsolete below vein 7 (R_5) or very faint..... 9.
8. Subterminal line irregular but distinct and clear to inner margin 10.
9. Fore wing with uniform bluish-grey ground color, markings black *nichollae nichollae*.
9. Fore wing more bluish, median and terminal areas more contrasting *nichollae garthi*.
10. T. p. line erect or concave below cell (southwestern).
sabulosa abrupta.
10. T. p. line excurved below cell (southern Rocky Mtns.).
sabulosa sabulosa.
11. Hing wing largely black, terminal band not narrowed opposite cell, remainder of hind wing white or light cream above and below *grandirena*.
11. Hind wing not as above 12.
12. Underside of fore wing with veins 7-3 (R_5 - Cu_1) streaked with black in terminal area 13.
12. Veins of underside of fore wing not streaked with black 14.
13. Hind wing and undersides bright orange-yellow (S. Rocky Mtn.) *petricola petricola*.
13. Hind wing and undersides light yellow or white (N. Rocky Mtn.) *petricola athabasca*.
14. Area between reniform and t. p. line concolorous with area between the t. p. and subterminal lines 15.
14. Area between reniform and t. p. line light, contrasting with the area between the t. p. and subterminal lines, usually white scales beyond reniform and extending along some veins in the postreniform area 18.
15. Fore wing grey, all markings including reniform obscure; hind wing and lower surfaces light cream or whitish.
hudsonica heathi ♀.
15. Fore wing with at least the reniform distinct; hind wing yellow or orange 16.
16. T. a. line single, sharply defined, excurved across cell then erect or slightly excurved to inner margin.....*edwardsi* (part).
16. T. a. double, sometimes weak, excurved in discal and submedian folds 17.
17. T. p. line faint, when traceable not bent back to lower end of reniform *ochracea*.

17. T. p. line black except sometimes near margins, clearly bending back to lower end of reniform *adumbrata* (part).
18. Discal spot of hind wing connected to postmedial band by black suffusion at least along cubital veins (see Pl. 3, figs. 2 & 16); hind wing usually yellowish-orange, yellow, cream or white 19.
18. Discal spot of hind wing not connected to postmedial band, sometimes absent; hind wing usually (not always) red, reddish-orange or pink and white 25.
19. T. a. line conspicuous, single, almost erect from cell to inner margin; subterminal line completely obsolete below vein 5 (M_2) *edwardsi*.
19. T. a. line more or less distinctly double, excurved below cell. 20.
20. Hind wing light cream or white 21.
20. Hind wing distinctly yellow or orange 22.
21. Fore wing highly mottled, sexes alike (mountains).
hudsonica (part).
21. Fore wing not so mottled, female with fore wing almost immaculate (plains of northwest) *hudsonica heathi*.
22. Fore wing grey or blue-grey, highly mottled, brown largely confined to median area or absent *hudsonica* (part).
22. Fore wing not mottled, usually predominantly brown 23.
23. Veins 3 and 4 (M_3 & Cu_1) clearly outlined by white in postreniform area; collar with distinct dark brown or black streak on both sides. Usually 36–44 mm. in wing expanse 24.
23. Veins 3 and 4 usually not outlined by white in postreniform area or only faintly so; collar usually concolorous, occasionally with faint brown streaks; subterminal line usually excurved across vein 7 (R_5). 30–38 mm. in wing expanse.³
adumbrata and *alleni*.
24. Hind wing yellow, the black markings heavy.
divergens divergens.
24. Hind wing pinkish-orange, the black markings lighter.
divergens form *socia*.
25. Hind wing vermilion, the black markings very light and the discal spot faint or absent; the contrasting median band of the fore wings narrow in submedian fold (2 mm.); t. p. line curving back to base of reniform just below vein 3 (Cu_1).
pulchra.

³ No one of these characters holds rigidly for all specimens but the combination works fairly well. Compare to figures or examine genitalia.

25. Hind wing not vermilion throughout or median space broader (3 mm.) and other characters different 26.
26. Collar concolorous or at most with very faint streaks; t. p. line curving back to base of reniform along vein 3 (Cu_1) 27.
26. Collar with contrasting dark streaks through it on both sides; t. p. line usually extending clearly beyond vein 3 and then curving back to it at or before reniform 30.
27. T. p. line definitely touching subterminal line at veins 3 and 4 (M_3 & Cu_1); veins 3 and 4 not streaked with white in post-reniform area; no distinct black dashes before subterminal line near costa *perplexa*.
27. T. p. line separated from subterminal throughout though sometimes very close to it at veins 3 and 4; or veins 3 and 4 streaked with white in postreniform area; usually with black dashes before subterminal line near costa 28.
28. T. p. line strongly excurved below cell then incurved across anal vein (see Pl. 4, figs. 4-13) *cf.* 31.
28. T. p. line straight or only moderately excurved below cell (see Pl. 3, figs. 15-19) 29.
29. Hind wing reddish or salmon, the black markings light (Pl. 3, fig. 19); reniform defined by clear white outwardly; aedaeagus with spined swelling (Pl. 9, fig. 1) *stretchii*.
29. Hind wing yellow or orange, the black markings heavier (Pl. 3, figs. 15-18); reniform not clearly defined by white outwardly; aedaeagus with distinct "hump" covered with spines (Pl. 8, fig. 1) *adumbrata* (part).
30. T. p. line outwardly oblique below cell or only slightly excurved; subterminal line not strongly incurved between veins 4 and 7 (R_5 & M_3). (See Pl. 3, fig. 2.) *socia* (part).
30. T. p. line excurved below cell; subterminal line usually strongly incurved between veins 4 and 7 (see Pl. 4, figs. 4-13) 31.
31. Sexes alike; hind wing yellow, orange or reddish (Rocky Mtns.). *howlandi*.
31. Male with hind wing white above and below at least in basal half; female reddish-orange or even vermilion (Texas to Calif.) *tejonica*.
32. Basal half or more of hind wing white, outer part dark with white lunule near center of termen; no discal spot (Pl. 1, figs. 32-33) (*Forsebia perlaeta*).
32. Hind wing dusky, darker in outer part *scrupulosa*.
32. Hind wing clearly banded in outer part; discal spot present though sometimes small 33.

33. Fore wing with white line defining outer edge of reniform and usually more or less streaked along veins 3 and 4 (M_3 & Cu_1) 34.
33. Fore wing with postreniform area concolorous, the reniform not defined by a white line which contrasts with the rest of the postreniform area 37.
34. Hind wing white or nearly so, discal spot faint, postmedial band rufous and fused with terminal band at apex, a contrasting black spot at middle of termen *eubapta*.
34. Hind wing usually not white above, discal spot more distinct, bands and spots of hind wing of same color, and postmedian and terminal bands separate throughout 35.
35. Postmedial band of hind wing thick throughout (N. Pacific states) *mirifica hastingi*.
35. Postmedial band of hind wing distinctly thinner or broken between veins 2-4 (M_3 to Cu_2) 36.
36. Underside of hind wing white or with only very faint pink flush (southwestern: Calif., Nev. & Ariz.).
mirifica mirifica.
36. Underside of hind wing suffused with salmon-pink except along costa (Rocky Mtn.: Colo., Nebr., Utah & northern N. Mex.).
mirifica klotsi.
37. Ground color of hind wing salmon-pink or red *ingeniculata*.
37. Ground color of hind wing white above and below (see *eubapta*).
37. Ground color of hind wing yellow or yellowish-orange 38.
38. Subterminal line defined only by preceding dark ground color
occulta.
38. Subterminal line light, defined by preceding dark ground color and succeeding dark irregular line, or subterminal represented by series of light points 39.
39. Fore wing of female almost immaculate (southern)
graphica graphica.
39. Fore wing of female maculate like male (northern)
graphica atlantica.

scrupulosa Henry Edwards

Synedoida scrupulosa Henry Edwards. 1878. Pac. Coast Lepid., no. 29, p. 9.

Type locality: Havilah, Kern Co., California (collected by R. H. Stretch).

Cotypes: 1 ♂, 2 ♀♀, Amer. Mus. Nat. Hist.; 2 ♂♂, U. S. Natl. Mus. (cotypes).

Figures: Maculation: Pl. 2, fig. 1 (cotype); photo presumably of cotype in Edwards' bound volume of Pac. Coast Lepid. Genitalia: Male genitalia figured in generic revision (Richards, 1936c); female genitalia, pl. 10, fig. 1.

A rare and distinctive species. Readily distinguished as the only species of the genus with spined fore tibiae and a fuscous hind wing which is darker apically. Thorax and fore wing grey; t. a. line black, excurved in discal and submedian folds and below anal vein; brown median line; t. p. line black, distinct, widely separated from the subterminal line; reniform distinct, outlined by black; postreniform area concolorous with rest of wing; subterminal line faint or complete; terminal line reduced to a series of black points between the veins.

Genitalia: In the male genitalia (Richards, 1936c) the uncus normal for genus; harpes narrow, relatively short; elasper greatly reduced on left harpé, absent on right harpé; clavus with small basal lobe; sacculus greatly reduced basally but with large broad terminal prongs widely fused to harpé near apex; aedaeagus with patch of spines on dorsal side near tip; vesica spined. In the female genitalia (pl. 10, fig. 1) the dorsal sclerite of the ductus bursae of moderate length; ventral sclerite small, narrow, somewhat produced medially.

Expanse: 40–45 mm.

Dates: July.

Distribution: California, Nevada, Utah and Colorado.

inepta Henry Edwards

Synedoida inepta Henry Edwards. 1881. Papilio, 1: 27.

Type locality: Southern Colorado. Cotypes: (according to original descr. 5 specimens) Amer. Mus. Nat. Hist. and U. S. Natl. Mus.

Synedoida morbosa Henry Edwards. 1881. Papilio, 1: 27–28.

Type locality: Colorado, Arizona, Utah and Florida (the last seems surely an error). Cotypes: Amer. Mus. Natl. Hist. and U. S. Natl. Mus.

Syneda violescens Hampson. 1926. Lepid. Phal. N. G. & Spec. Noct., p. 45–46.

Type locality: Palmerlee, Huachuca Mtns., Arizona. Type: 1 ♀, British Museum.

Figures: Maculation: Pl. 2, figs. 2–4. Also colored figure in Holland's Moth Book where the species is given under the genus *Cissusa* (pl. 30, fig. 10). Genitalia: Male pl. 7, fig. 5; female pl. 10, fig. 2.

The general color of the fore wing varies from reddish-grey (*inepta*) to grey, to brown-grey and ochreous (*morbosa*), to dull violaceous (*violescens*) to dark grey. The hind wing is fuscous or smoky, darker apically, and so the only species with which it might be confused is *sabulosa*. From this it differs in the almost or quite concolorous collar, the indistinctness of the t. a. and t. p. lines which are never clear black lines, the terminal line being usually reduced to a series of points between the veins, and the cilia concolorous.

Racial differentiation in this species is questionable. From some localities only one color form has been collected (for instance the author found only very dark grey specimens in northern Utah near Logan in June, 1933) but from other localities a variety of color forms may be obtained. Sometimes one obtains a hodge-podge of colors from one place, but sometimes the colors are more nearly the same and tend to resemble the color of the rocks on which the adults rest during the day.

Genitalia: The male genitalia (pl. 7, fig. 5) have short harpes which are rather strongly sclerotized; claspers small; clavus moderate, the one on the right harpé longer, basal lobes of clavus moderate; sacculus reduced in various degrees, sometimes with moderate shelf-like projections basally, sometimes with very small projections which seem separated from the more distal parts of the sacculus; aedaeagus with patch of few or numerous spines on dorsal side near tip; vesica spined. Female genitalia (pl. 10, fig. 2) with dorsal sclerite of ductus bursae of moderate length; ventral sclerite rather narrow, slightly thicker at middle.

Expanse: 40–48 mm. Rarely to 35 and 52 mm.

Dates: April, June, July, August and September.

Distribution: Colorado, Utah, New Mexico and Arizona. (One cotype of *morbosa* recorded from Florida but this seems certainly an error.)

This species is a denizen of open rocky hillsides where it rests on the ground and rocks during the daytime, the specimens frequently tending to match more or less the color of the rocks of the vicinity. It is found at rather low elevations (4000–6000 ft. usually) in country that becomes quite dry in middle and late summer. The adults fly mostly from early June to mid-July.

sabulosa Henry Edwards

Synedoida sabulosa Henry Edwards. 1881. Papilio, 1: 26–27.

Type locality: Southern Colorado. Types: Amer. Mus. Nat. Hist. and U. S. National Museum (4 specimens according to original description).

sabulosa race *abrupta* Barnes & McDunnough

Syneda abrupta Barnes & McDunnough. 1918. Contrib. Nat. Hist. N. A. Lepid., 4: 119-120, pl. 19, figs. 12 & 14.

Type locality: Palmerlee, Huachuca Mtns., Arizona (some of paratypes from Jemez Springs, New Mexico). Types: 2 ♂♂, 3 ♀♀, U. S. National Museum.

Figures: Maculation: Pl. 2, figs. 5-7. Also colored figures of *sabulosa sabulosa* in Holland's Moth Book (Pl. 30, fig. 11) and in Grote's Illustrated Essay (Pl. 4, fig. 39. 1882), and photographs of both sexes of *sabulosa abrupta* in original description. Genitalia: Male: Pl. 7, fig. 6; female: pl. 10, fig. 4.

This and the following species are separated from all others by having the hind wing fuscous or dirty white suffused with fuscous basally, darker apically, the banding discernible below but scarcely visible above; collar with prominent dark streaks on both sides; the t. a. and t. p. lines black; the subterminal line sharply angled in opposite cell, and the cilia of the fore wing more or less distinctly checkered. The chief possibilities for confusion are between females of the race *abrupta* and *fumosa* (see under *fumosa*), and with the following species (see under *nichollae*).

Division of *sabulosa*, *abrupta*, *nichollae* and their variants into species or races is one of the hardest tasks in revising this genus, no doubt partly due to insufficiency of material (except of the Colorado form) and to the wide gaps between points of collection. The genitalia are inseparable, or at least the differences extremely slight. And I have found no characters for constant key separation of the forms although I must admit they present a somewhat different habitus which I find difficult to describe without colored figures. The maculation characters, as frequently the case in this genus, vary greatly and intergrade. For instance, much use has been made in descriptions of the course of the t. p. line from the reniform to the inner margin (excurved in submedian fold or not) but in the series the author has had for study all intergrades are shown from evenly incurved to evenly excurved. And, while on the subject of habitus, it might not be amiss to mention that there are two different color forms in Colorado. The types (both at U. S. N. M. and A. M. N. H.) are distinctly grey, whereas virtually all the other specimens seen have been distinctly brown.

The two races may be compared as follows: *sabulosa*: color of body and fore wings grey or brown; median area broad, not sharply contrasting with rest of wing; postreniform area with some white scales or with reniform defined by white outwardly which also out-

lines veins 3 and 4; t. p. line usually clearly excurved below cell; subterminal line principally defined by preceding dark ground color, strongly incurved opposite cell; cilia faintly checkered; hind wing fuscous at base, darker outwardly, cilia brownish or smoky. *Abrupta*: fore wing grey suffused with black; median area contrastingly lighter than basal and terminal areas; reniform defined outwardly by white which also outlines veins 3 and 4; t. p. line erect or (usually) slightly excurved below cell; subterminal line as in *sabulosa*; cilia clearly checkered; hind wing dirty white basally, dark outwardly, cilia mostly white or whitish (see also under *nichollae*).

Genitalia: The male genitalia (Pl. 7, fig. 6) have the clasper on the left harpé small, on right harpé absent, its position indicated by slightly heavier sclerotization and setae; clavus moderate, longer on right side, basal lobe small and arising well above base of clavus; sacculus on left harpé with small or moderate shelf-like projection basally which is more or less separated from the rudimentary terminal part of the sacculus; sacculus on right harpé with shelf-like projection greatly reduced or absent (position indicated by patch of setae), the terminal half strongly sclerotized; aedaeagus with spines on dorsal side near tip; vesica spined. The female genitalia (Pl. 10, fig. 4) have the dorsal sclerite of the ductus bursae of moderate length; ventral sclerite rather narrow, somewhat irregular and somewhat produced medianly.

Expanse: 32–40 mm., some specimens of *abrupta* reaching 44 mm.

Distribution: *sabulosa sabulosa*: Colorado, New Mexico and Utah.

sabulosa abrupta: Arizona, New Mexico and southern California.

Dates: June, July and September.

nichollae Hampson

Syneda nichollae Hampson. 1926. Lepid. Phal. N. G. & Spec. Noct., p. 45.

Type locality: Ashnold, British Columbia (Mrs. Nicholl).

Types: 3 ♀♀, British Museum.

Figures: Maculation: Pl. 2, figs. 8–10. Male genitalia: Pl. 7, fig. 7.

This species is differentiated from the preceding by the subterminal line which becomes barely traceable or obsolete below vein 7 (R_5). The body and fore wings are grey or bluish-grey suffused with brown and black especially in basal area and beyond t. p. line; median area contrasting with basal and subterminal areas; reniform with some

white scales beyond it but veins 3 and 4 not clearly defined by white; t. p. line erect below cell or slightly incurved; cilia faintly checkered; hind wing smoky-grey at base, darker outwardly; cilia cream or light brown.

After having placed *nichollae* as a race of *sabulosa* in the generic revision, the author is forced to re-establish it as a species, despite genitalic similarity, partly because of the subterminal line but largely because of the distribution. The author has seen *nichollae* from scattered localities from northern California to southern British Columbia and east and south to Montana with thence a gap across Wyoming and Colorado and then a series of three specimens collected at Alpine, Texas, by O. C. Poling (at U. S. N. M.). The gap from southern California to Colorado is occupied by *sabulosa* and its race *abrupta*. Inasmuch as there seems no reason for questioning the data on the short series collected by Poling, it seems that *nichollae* must for the present at least be classed as a distinct species since one race can scarcely exist on both sides of another race of the same species when there are no apparent habitat differences. Judging from some of the other species in this genus, genitalic similarity is not necessarily indicative of specific identity (note *eubapta*, *occulata* and *tejonica*).

Genitalia: (Pl. 7, fig. 7) Not separable from *sabulosa*, *q. v.*

Expanse: 33–40 mm.

Dates: June and July.

Distribution: Washington, southern British Columbia, Idaho, Montana (Hamilton) and Texas (Alpine). Race *garthi*: Yosemite, California.

nichollae race *garthi*, race nov.

Figures: Maculation: Pl. 2, figs. 9–10.

Male holotype: Fore wing with the ground color distinctly blue-grey; basal area suffused with brown; basal line black; t. a. line double, outer line black, excurved in discal and submedian folds; median space narrow, contrastingly ochreous except at costa and inner margin where it is bluish-grey; median line single, brown; reniform brown, basally defined by a few black scales and preceding white line, outwardly defined by white which is faintly extended along veins 3 and 4; t. p. line black, angled out on vein 7 and bluntly across veins 3 and 4, extending back to base of reniform along vein 3, thence almost erect to near inner margin where it is excurved; subterminal line defined by preceding dark ground and by two black dashes near

costa, barely traceable as waved line of lighter spots below vein 7; terminal area blue-grey; terminal line complete; cilia faintly checkered. Hind wing fuscous; light crescent across cubitals beyond faint postmedian band; cilia light. Beneath fore wing light powdered with dark scales, oblique dark shade from reniform to inner angle and dark dash from near apex towards inner margin; cilia distinctly checkered; hind wing light with darker irroration; dark discal spot, faint postmedian and incomplete terminal lines.

Female allotype: Like the male but t. a. line not so distinctly excurved across cell; median area grey; median line faintly double; t. p. line recurved from vein 4 without angle on vein 3; subterminal line lost below vein 7. Beneath markings same but more distinct and complete.

Male Holotype: Yosemite, California, June 28, 1933 (collected by John S. Garth).

Female Allotype: Same data (both Holo- and Allotype deposited in U. S. National Museum).

Mr. Garth collected six specimens of this race, all at the same time and place, but only the above two are before the author for inclusion in the type series.

This race is distinguished from nymotypical *nichollae* by the bluer color, the much more colorful and contrasty fore wing, and perhaps by the narrower median area.

biformata Henry Edwards

Synedoida biformata Henry Edwards. 1878. Pac. Coast Lepid., no. 29, p. 9.

Type locality: Havilah, Kern Co., California. Types: 2 ♂♂, 1 ♀, Amer. Mus. Nat. Hist. and U. S. National Museum.

Figures: Maculation: Pl. 2, fig. 14. Genitalia: Male: Pl. 7, fig. 8; Female: Pl. 10, fig. 5.

A rare and distinctive species. Basal line black; t. a. line black, oblique to middle of submedian fold, sometimes not straight but never excurved in cell, incurved or angled in across anal vein; median area rather concolorous, no definite median line; reniform indistinct with faint basal line; postreniform area concolorous without distinct white lines; t. p. line black, following usual course around reniform, angled back to base of reniform just below vein 3 (Cu_1), then erect to middle of submedian fold and then abruptly angled outwards to inner margin; subterminal line faint, sinuous, defined only by the

slightly darker preceding ground color; terminal line faint or absent; cilia concolorous with the terminal area. Hind wing light at base, cream or faded pink in outer part; discal spot very faint or absent; postmedian band not traceable; some diffuse fuscous scales at apex and middle of termen. Beneath the hind wing uniform light pinkish cream without black markings.

Genitalia: The male genitalia (Pl. 7, fig. 8) have the claspers single, short and broad; clavus normal, somewhat longer on right harpé, the basal lobes about three times as long as broad; sacculus well-developed and with a large terminal prong on both harpes; aedaeagus with patch of spines on dorsal side near tip. The female genitalia (Pl. 10, fig. 5) have the dorsal sclerite of the ductus bursae rather long; the ventral sclerite narrow except medianly where it is produced in both directions.

Expanse: 37–40 mm.

Distribution: California.

ochracea Behr

Syneda ochracea Behr. 1870. Trans. Amer. Ent. Soc., 3: 25.

Type locality: San Francisco & Marion Co., California.

Types: all lost.

Figures: Maculation: Pl. 2, figs. 15–16. Also a photo, perhaps type or compared with type, in Edwards' bound copy of Pacific Coast Lepidoptera. Male genitalia: Pl. 9, fig. 3.

A distinctive species. Females larger and darker than males. Thorax and fore wing greyish or ochreous ranging to medium dark brown; t. a. line weak, double, excurved in discal and submedian folds; reniform defined by black and connected by two lines to the costa; t. p. line very faint or obsolete, when traceable not angled back to reniform but strongly angled in on vein 2 (Cu_2); subterminal line faint or obscure; some black streaks or suffusion between veins at apex. Hind wing orange with usual black discal spot and postmedian and terminal black bands; base sometimes suffused with black. Underside of forewings orange with solid black reniform which is not connected to the subapical fuscous band.

It is possible that slightly differentiated desert and mountain races exist in this species.

Genitalia: The male genitalia (Pl. 9, fig. 3) have a very heavy uncus with unusually long black bifurcated setae; clasper small on right harpé, absent on left harpé; clavus much longer on right side and with a longer basal lobe, basal lobe on left clavus small; sacculus well-developed as shown; aedaeagus with patch of spines on

dorsal side near tip; vesica spined. The female genitalia are similar to those of *inepta*.

Expanse: 40–48 mm.

Dates: May, June and July.

Distribution: California, Arizona, Nevada, Utah, Colorado, Montana, Idaho and southern British Columbia.

edwardsi Behr

Syneda edwardsi Behr. 1870. Trans. Amer. Ent. Soc., 3: 28.

Type locality: Alameda and other parts of Contracosta, California. Types: all lost.

Figures: Maculation: Pl. 3, fig. 12. Also colored figure in Holland's Moth Book (Pl. 30, fig. 37) and a photo in Edwards' bound copy of his Pacific Coast Lepidoptera. Genitalia: Male: Pl. 7, fig. 4; Female: Pl. 10, fig. 3.

Another distinctive species readily recognized from the figures and the key to species. As usual in this genus there is considerable variation. The hind wing varies from yellow through orange to almost vermilion, and the black margins on this wing vary considerably in breadth. The fore wing is usually as in Holland's figure and the photo given herein but the author has seen a number of specimens in which the fore wing was rather uniformly dark (powdered and suffused with black), the usual markings visible but with no contrasts.

Genitalia: The male genitalia (Pl. 7, fig. 4) have harpes of different size and shape; the right harpé short and blunt, the left harpé longer and oblique to end of long sacculus; clasper bifurcated on left harpé, single on right; clavus of moderate length but basal lobes usually vestigial (sometimes present as small lobes on left clavus); sacculus well-developed, elongated distally and with small terminal prongs; aedaeagus without external spines; vesica spined. The female genitalia (Pl. 10, fig. 3) have the dorsal sclerite of the ductus bursae long; the ventral sclerite rather narrow with a blunt median projection extending to the opening of the ductus bursae.

Expanse: 30–38 mm.

Dates: May, June, July and August.

Distribution: Arizona, California (northern and southern), Oregon and Washington.

pallescens Grote & Robinson

Melipotis pallescens Grote & Robinson. 1866. Proc. Ent. Soc. Phila., 6: 21–22, pl. 3, fig. 5.

Type locality: Texas (E. T. Cresson). Types: 1 ♀, Phila. Acad. Sci.

Melipotis tenella Henry Edwards. 1881. Papilio, 1: 26.

Type locality: N. W. Texas (J. Boll). Types: ♂ and ♀, U. S. National Museum.

Figures: Maculation: Pl. 2, figs. 11–12. Also figure in original description of *pallescens*, and a colored figure in Holland's Moth Book (Pl. 30, fig. 25). Genitalia: Male: Pl. 7, fig. 3; Female: Pl. 10, fig. 6.

This is one of the two species of this genus which have the basal part of the hind wing white, the apical part dark fuscous or black, but with the banding incomplete or obscured and the discal spot lacking. Superficially it resembles a species of *Melipotis* from which it may be separated by the structure of the palpi and genitalia. From *fumosa*, the other species with a similar hind wing, it may be separated by the usually pinkish-grey thorax and base of the fore wing, the usually evenly excurved t. a. line (sometimes very slightly excurved in discal and submedian folds), the uniform cilia, and the incomplete white lunule at the middle of the termen of the hind wing. Some specimens have some dark suffusion in the basal half of the hind wing, especially along the veins of the lower part of the cell.

The name *tenella* is based on specimens in which the black band on the hind wing is greatly reduced. It occurs rarely in diverse localities.

Genitalia: The male genitalia (Pl. 7, fig. 3) has the left clasper broadly bifurcated, right clasper long; clavus very long, with long basal lobe arising near extreme base of clavus; sacculus varying in size of the shelf-like projection, terminal prong small; aedaeagus normal, without external spines; vesica moderately spined. The female genitalia (Pl. 10, fig. 6) have the dorsal sclerite of the ductus bursae moderately long; ventral sclerite narrow and medianly produced into a point.

Expanse: 35–48 mm.

Dates: May, June, July, August and September.

Distribution: Texas, Arizona, Lower California (Mexico), California, Nevada, Utah, Idaho and Montana.

fumosa Strecker

Syneda fumosa Strecker. 1898. Lepid. Rhopal. & Heter., Suppl. 1: 12.

Type locality: Texas (Bern. Gerhard). Type: 1 ♀, Field Museum (Chicago).

fumosa race *brunneifasciata* Barnes & McDunnough

Syneda brunneifasciata Barnes & McDunnough. 1916. Contrib. Nat. Hist. N. A. Lepid., 3: 17, pl. 1, fig. 4.

Type locality: Camp Baldy, San Bernardino Co., California (July 16). Types: 1 ♂, 1 ♀, U. S. National Museum.

Figures: Maculation: Pl. 2, fig. 13. Also photograph of *brunneifasciata* in the original description. Genitalia: Male: Pl. 7, fig. 1; Female: Pl. 10, fig. 7.

A rare species that differs from *pallescens* in having the thorax and base of the fore wing mottled grey-brown, the t. a. line excurved in both discal and submedian folds, and the hind wing without a distinct white lunule at the middle of the termen. Reniform also defined outwardly by white which is more or less streaked onto veins 3 and 4, and in nymotypical *fumosa* the cilia of the fore wing are checkered. Females may be confused with *sabulosa abrupta*, but in *abrupta* the dark outer part of the hind wings on the undersides is curved and not sharply set-off from the lighter base whereas in *fumosa* the line of separation is sharper and straight.

This species varies widely, and in view of the few dozens of specimens known it is questionable whether or not to hold the name *brunneifasciata* as a distinct race. The series at the U. S. National Museum shows a considerable degree of intergradation and led the author to place *brunneifasciata* in synonymy in the preliminary listing given in the generic revision. Conservatism and an attempt to define races leads the author now to place it, still tentatively, as a Californian race. The type of *fumosa* has the median band of the fore wing grey and the cilia checkered black and white; the types of *brunneifasciata* have the broad median band ruddy-brown and the cilia uniformly smoky.

The maculation of the fore wings of this species reminds one of *divergens*, with which the genitalia also relate it.

Genitalia: The male genitalia (Pl. 7, fig. 1) have the claspers about twice as long as broad, single, the one on the left harpé pointed, the one on the right harpé blunt; basal lobe of clavus only about as long as broad; sacculus with well-developed shelf-like projection, narrow beyond this and with a small distal prong, similar on the two harpes; aedaeagus without external spines; vesica spined. The female genitalia (Pl. 10, fig. 7) have the dorsal sclerite of the ductus bursae very short; the ventral sclerite long and broad (compare *divergens*).

Dates: July and August.

Distribution: *fumosa fumosa*: Texas.

fumosa brunneifasciata: Arizona and California.

divergens Behr

Syneda divergens Behr. 1870. Trans. Amer. Ent. Soc., 3: 27-28.

Type locality: Foothills of the Sierra Nevada, California.

Types: those in Behr collection destroyed; 1 ♀ cotype (paratype) in Field Museum (Chicago).

divergens form *socia* Behr

Syneda socia Behr. 1870. Trans. Amer. Ent. Soc., 3: 27.

Type locality: Ft. Tejon, California. Types: all lost.

Figures: Maculation: Pl. 3, figs. 1-2. Also colored figures of both in Holland's Moth Book (Pl. 30, figs. 32 & 38), figure presumably of a type of *divergens* in the Whitney Geological Survey Report, and photos of both, perhaps from types, in Edwards' bound copy of his Pacific Coast Lepidoptera. Genitalia: Male: Pl. 7, fig. 2; Female: Pl. 10, fig. 8.

A large species that can be most readily spotted from the figures. Despite the obvious placement of most specimens by comparison it has been difficult to try to find an unvarying character to separate this species from *adumbrata* in the maculation key. The difficulty is due primarily to the enormous range of variation of *adumbrata*.

The forms *divergens* and *socia* intergrade but both names seem worthy of retention. They are perhaps best separated by the ground color of the hind wing; less serviceable characters include the amount of black on the hind wing, and the contrastiness of the fore wing, especially the median and terminal areas. Some specimens of *socia* have the discal spot of the hind wings separate from the postmedial band. Both forms are wide-spread in California, especially *socia*, which is seldom matched by specimens from elsewhere, but the author has no positive records of these two having been captured flying together and very few records of their having been taken at the same place. Superficially *socia* looks like a valid race, but the distributional records are such that it seems better to place it as a color form.

Genitalia: The male genitalia (Pl. 7, fig. 2) have the claspers single, the one on the left harpé very small; clavus long and slender, longer on the right side, basal lobe small or very small; sacculus reduced, variable but always present, terminal prong of sacculus small or absent; aedaeagus without external spines; vesica spined. The female genitalia (Pl. 10, fig. 8) have the dorsal sclerite of the ductus bursae of moderate length; the ventral sclerite very long and broad (compare *fumosa*).

Expanse: Normally 36–44 mm., but dwarfs as small as 30 mm.

Dates: February to September in Arizona and California; April to August farther north.

Distribution: *divergens divergens*: Arizona, California, Oregon, Washington, Idaho, Montana, Nevada, Utah and Colorado. *divergens socia*: common throughout California and a few similar specimens seen from Washington, Utah and Colorado.

Early stages: Dodge. Lepidopterist, 3: 117. 1920.

Food plant: Elder (*Sambucus glauca*)—teste Mr. S. E. Crumb.

Judging from the locality labels this species occurs in a wide range of elevations. The records seem largely from mountainous country, and the one time the author collected this species in Utah it was in open woods in upper Canadian zone. It is usually found, at least in the eastern half of its range, together with *adumbrata*.

grandirena Haworth

Phytometra grandirena Haworth. 1809. Lepid. Britt., p. 264.

Aedia limbolaris Geyer. 1827. Zutr. exot. Schm., 4: 23, figs. 689 & 690.

Type locality: Georgia. Types: lost but figured.

Figures: Maculation: Pl. 4, fig. 3. Also figured in colors in Holland's Moth Book (Pl. 30, fig. 27) and in the original description of *limbolaris*. Genitalia: Male: Figured in generic revision (Richards, 1936c); Female: Pl. 11, fig. 11.

Readily recognized from the figures. Resembles a species of *Melipotis* in general appearance. This species is equally distinctive by the maculation, smooth front and genitalia; it has no close relatives (but the maculation of the undersides of the hind wings remind one of *graphica* and *occulta* which have quite different genitalia).

Genitalia: The male genitalia (see generic revision for figure) have a greatly swollen uncus covered with unusually long black bifurcated setae; claspers single; clavus with small basal lobe; sacculus with a broad shelf-like projection, distally with a free prong; aedaeagus without external spines; vesica spined. The female genitalia (Pl. 11, fig. 11) have the dorsal sclerite of the ductus bursae very long, broader near the bursa; the ventral sclerite narrow, somewhat wider medianly; bursa with more sclerotized patch with spines near the ductus bursae.

Expanse: 35–40 mm.

Dates: April, May, August and October in the south; May to August in the north.

Distribution: New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Wisconsin, Maryland, Virginia, North Carolina, South Carolina, Tennessee, Georgia, Alabama and Florida (including southern part).

Although this species is frequently captured and all collections have it in series, still specimens are almost always taken singly and the author has no record of a series having been taken anywhere at any time. The author has taken the species only at light but Mr. Otto Buchholz says he has taken about a dozen specimens, representing both sexes, always singly, in open spots close to woods on top or near the top of the Orange and Ramapo Mountains, New Jersey.

petricola Walker

Euclidia petricola Walker. 1858. Cat. British Mus., 14: 1462.

Type locality: "Rocky Mountains." Type: British Museum.

petricola race *athabasca* Neumoegen

Syneda athabasca Neumoegen. 1883. Papilio, 3: 143-144.

Type locality: Belly River, N. W. British Columbia (Capt. Gedder). Types: ♂ & ♀, U. S. National Museum.

petricola race *athabasca* form *crockeri* Barnes & Benjamin

Syneda athabasca form *crockeri* Barnes & Benjamin. 1924. Ent. News, 35: 15.

Type locality: Saskatchewan, Canada. Types: ♂ & ♀, U. S. National Museum.

Figures: Maculation: Pl. 3, figs. 3-4. Also colored figures in Holland's Moth Book where the form *crockeri* is given under the name of *athabasca* (Pl. 30, fig. 29), and where what looks like the true *athabasca* is given under the name of *alleni* (Pl. 30, fig. 35). Male genitalia: Pl. 8, fig. 4.

This little mountain species, the smallest in the genus, is readily separated as the only species in the genus with veins 7-3 (R_5 to Cu_1) streaked with black in the terminal area on the underside of the fore wings. On veins 7-5 the vein is defined as a black line, on veins 4-3 the black is more suffused especially towards the termen.

Petricola is the southern Rocky Mountain race. It is somewhat larger and has the hind wing and undersides bright orangish-yellow. *Athabasca* is the scarcely distinct northern Rocky Mountain race. As Barnes & Benjamin pointed out in the original description of

crockeri, it is difficult to judge the original color of the type of *athabasca* but presumably it was light yellow or cream. The form *crockeri* is the extreme in which the hind wing and lower surfaces are pure white and the fore wings with more white and bluish and no brown. As color forms go it certainly is a distinct one, and the author, not having seen *athabasca* and *crockeri* from the same locality, would be inclined to class it as a race were it not for the contrary opinion of Dr. McDunnough who has had the opportunity to examine much more Canadian material.

Genitalia: The male genitalia (Pl. 8, fig. 4) are nearly symmetrical and heavily and rather uniformly sclerotized; claspers small and single; clavus long and curved, the basal lobe small or almost lost; sacculus with a small shelf-like projection, the terminal prong blunt, its length variable; aedaeagus seemingly without external spines; vesica spined. The female genitalia are similar to those of *hudsonica* but the ventral sclerite of the ductus bursae is narrower.

Expanse: 25–32 mm. (*petricola petricola* largest, *crockeri* smallest).

Dates: May, June and July.

Distribution: *petricola petricola*: Colorado, Utah and Montana;
petricola athabasca: British Columbia, Alberta,
Saskatchewan, Manitoba and perhaps Mon-
tana.

petricola athabasca form *crockeri*: Saskatchewan
and Manitoba.

In the La Sal Mountains of Utah, *petricola* was collected commonly visiting mint flowers on a chaparral covered mesa (Transition zone) in mid-July by Dr. Alexander B. Klots (locality known to this author). This was much lower than where the author had collected *adumbrata* and *divergens* in the upper edge of the aspen belt (upper Canadian zone) in the same mountains three years earlier.

hudsonica Grote & Robinson

Syneda hudsonica Grote & Robinson. 1865. Proc. Ent. Soc.
Phil., 4: 494–496, pl. 3, fig. 7–8.

Type locality: Hudson's Bay Territory (Kennicott).

Types: 1 ♂, 1 ♀, Philadelphia Acad. Nat. Sci.

hudsonica race *heathi* Barnes & McDunnough

Syneda hudsonica heathi Barnes & McDunnough. 1918. Con-
trib. Nat. Hist. N. A. Lepid., 4: 122, pl. 19, figs. 9–10.

Type locality: Cartwright, Manitoba (June). Types: 2 ♂♂, 3 ♀♀, U. S. National Museum.

Syneda pedionis Hampson. 1926. Lepid. Phal. N. G. & Spec. Noct., p. 42-43.

Type locality: Winnipeg, Manitoba (Wallis). Types: 1 ♂, 1 ♀, British Museum.

hudsonica race (?) *seposita* Henry Edwards

Syneda seposita Henry Edwards. 1881. Papilio, 1: 25.

Type locality: southern Colorado. Types: ♂ & ♀, U. S. National Museum and Amer. Mus. Nat. Hist.

hudsonica race (?)

See under *nubicola* and *maculosa*.

Figures: Maculation: Pl. 3, figs. 5-11. Also *hudsonica* and *heathi* both figured in original descriptions; photograph of *hudsonica* given by Barnes & McDunnough in Contributions Nat. Hist. N. A. Lepid., vol. 4, pl. 19, figs. 7-8, and a colored figure of *hudsonica* in Holland's Moth Book (Pl. 30, fig. 31). Genitalia: Male: Pl. 8, figs. 7-8; Female: Pl. 11, figs. 7-8.

This is another variable species clearly separated into two races, one in the mountains, the other in the northern plains and prairies. The mountain form (*hudsonica hudsonica*) is characterized by the fore wing being of very mottled appearance and the sexes alike. Also the fore wing is grey, blue-grey, violaceous or brown (always mottled with black scales), the usual lines not sharply defined; postreniform area light with the reniform when distinct extended as long points on veins 3 and 4, these veins not being defined with white which contrasts with the rest of the postreniform area; t. a. and t. p. lines usually both excurved below cell; subterminal line complete, sinuous or irregular; terminal line complete; hind wing white, cream or light yellow, the black markings heavy, and the discal spot broadly connected with the postmedian band.

The prairie race (*heathi*) is sexually dimorphic. Both sexes lack the mottled appearance of the mountain race. In the male the usual markings of the fore wing are complete and similar to the specimens from the mountains, from which they differ in the absence of the mottling (there is a powdering of black scales), the shade of the greyish or blue-grey fore wing, and the hind wing and lower surfaces being always a very light cream. The female has all the markings of the fore wing obscure or obsolete, otherwise it is like the greyish males.

The form at the southern end of the Rocky Mountains (Colorado) is a rather poor race not clearly separated from northern specimens. As a rule the specimens are more brownish than grey, or even largely suffused with brown. The name *seposita* is available for use here if desired. The form at the southern end of the range of the species in California (vicinity of Tuolumne Meadows and Inyo County) seems to represent a distinct race though adequate material is not at hand to evaluate such. The single Californian specimen at hand appears more marbled and violaceous. The name *nubicola* and probably also *maculosa* seem applicable (see under *nubicola* and *maculosa*).

There is a discrepancy in the type series of *hudsonica*. The male type, which will fix the application of the name, is a representative of the mountain race as shown by the photograph reproduced here and by compared with type material in the author's collection. The female type, however, seems to be a somewhat more maculate than usual female of the plains race (*heathi*).

Genitalia: The male genitalia (Pl. 8, figs. 7-8) are more nearly symmetrical than those of most species in this genus; claspers single, well-developed; clavus long and slender, longer on right side, basal lobes arising at base and three to four times as long as broad; sacculus with a distinctive shelf-like projection somewhat recurved towards base and bearing a cluster of unusually heavy macrosetae; aedaeagus with very minute, scarcely discernible microtrichiae on the membranous dorsal side near the tip; vesica spined. The female genitalia (Pl. 11, figs. 7-8) have the dorsal sclerite of the ductus bursae of moderate length; the ventral sclerite a moderately heavy band bluntly produced distally at the center.

Expanse: 30-40 mm.

Dates: Mostly June and July but records from May through August.

Distribution: *hudsonica hudsonica*: "Hudson Bay to Alaska and down the Rockies at higher altitudes" to southern Colorado in the east and Inyo Co., California in the west. Specimens studied from Alaska, Alberta, Montana, Wyoming, Colorado, Utah and California. *hudsonica heathi*: British Columbia, Saskatchewan, Alberta, Manitoba, Montana, North Dakota and Nebraska. (There is one specimen of the mountain race in the Amer. Mus. Nat. Hist. labeled "N. Y." but this seems likely an error.)

nubicola Behr

Syneda nubicola Behr. 1870. Trans. Amer. Ent. Soc., 3: 25-26.

Type locality: Alpine prairies around headwaters of Tuolumne River, California. Types: all lost.

maculosa Behr

Syneda maculosa Behr. 1870. Trans. Amer. Ent. Soc., 3: 26.

Type locality: Headwaters Tuolumne River, California.
Types: all lost.

There seems to the author little doubt but that the above two names represent synonyms or at most a northern Californian race of the mountain race of *hudsonica*. However, the author hesitates to place these names definitely in synonymy in the absence of topotypical material. The description of *nubicola* sounds more certainly that of a form of *hudsonica* than the description of *maculosa* does.

Although lacking topotypical material the author does have in his collection a single female from Round Valley, Inyo County, California, Elev. 6,500 ft., August 5, 1928 (collected by John S. Garth). This specimen (Pl. 3, figs. 7-8) shows the essential features of Behr's descriptions of both *nubicola* and *maculosa* but does not match perfectly his short and unsatisfactory description of either name. This specimen is unquestionably a variant of the mountain race of *hudsonica* but looks distinct from all the other specimens the author has seen. The fore wing is distinctly violaceous (as called for in Behr's descriptions) with little or no brown, and with the markings of *hudsonica* but with the color values all changed; the hind wings are creamy at the base, yellowish apically, with the usual black markings; beneath both wings white with some black powdering and the black markings of the mountain race of *hudsonica*.

This specimen is sufficiently near the descriptions of Behr's names but unfortunately the locality while near Tuolumne Meadows in terms of miles is quite different in biotic terms. Mr. Garth writes, "Round Valley is on the abrupt East slope of the Sierra Nevada. The flora and fauna are influenced to a marked degree by ascending currents of heated air from the Owens Valley, which is removed but one valley from 'Death Valley' and is continuous on the north with the Mono Basin which is emphatically of the Great Basin fauna . . . 6,500 ft. is Transition zone. . . . About 50 miles north of Round Valley and opposite Mono Lake the Tioga Pass, elevation almost 10,000 ft., communicates with the Tuolumne Meadows, the drainage of which is Pacific and the flora of which is cismontane. The pass forms an entering wedge for a number of Great Basin butterflies and may also let your *Syneda* through. However, unless it is a Hudsonian flyer, the chances are against this." This species

does fly in a wide range of elevations including Hudsonian. The author is inclined to believe that this specimen belongs to the same population that furnished Behr's specimens of *nubicola* and *maculosa* but he prefers to await topotypical material before definitely synonymizing the names.

perplexa Henry Edwards.

Syneda perplexa Henry Edwards. 1884. Papilio, 4: 47.

Type locality: Arizona. Type: 1 ♂, U. S. National Museum.

Figures: Maculation: Pl. 3, figs. 13-14. Male genitalia: Pl. 8, fig. 3.

A distinctive and not very common species. There is considerable variation in the amount of red-brown suffusion on the fore wings. The t. a. line is double, the inner line faint (fig. 14), sometimes filled in with black (fig. 13), usually evenly excurved; t. p. line clearly touching the subterminal line at veins 3 and 4, excurved below cell; postreniform area usually concolorous except for white line on outer edge of reniform; veins 3 and 4 never sharply defined with white; no black dashes before subterminal line near costa; terminal area blue-grey, contrasting with rest of wing; terminal line reduced to a series of points between the veins. Hind wing yellowish-orange, the black markings light, the discal spot not connected with the postmedian band. Beneath ruddy-orange, the black markings incomplete.

Genitalia: The male genitalia (Pl. 8, fig. 3) have the claspers single, or the one on the left harpé with a barely detectable costal lobe widely separated from the other part; clavus normal on both sides, with moderate basal lobes; sacculus moderate; aedaeagus with a large dorsal hump covered with heavy spines (similar to that of *adumbrata*, *q. v.*); vesica spined. The female genitalia have the dorsal sclerite of the ductus bursae long; the ventral sclerite weak and moderately narrow.

Expanse: 34-38 mm.

Dates: April, May, June and July.

Distribution: Arizona, Nevada, Utah, Colorado and Montana.

adumbrata Behr

Syneda adumbrata Behr. 1870. Trans. Amer. Ent. Soc., 3: 27.

Type locality: Downieville, California. Types: destroyed except 1 ♀ cotype (paratype) in the Field Museum.

adumbrata race *saxea* Henry Edwards

Syneda adumbrata var. *saxea* Henry Edwards. 1881. Papilio, 1: 26.

Type locality: Colorado and higher Sierra Nevadas, California. Types: 3 ♂, 4 ♀ according to original description; one of the Colorado females is at the Amer. Mus. Nat. Hist.; some of the others will no doubt be at the U. S. National Museum.

adumbrata race *alleni* Grote

Syneda alleni Grote. 1877. Canadian Ent., 9: 215.

Type locality: Orono, Maine. Types: Recorded by Smith for British Museum. Mr. Gerhard writes that there is 1 ♂ type in the Field Museum received from Fernald.

Figures: Maculation: Pl. 3, figs. 15-18. Also good colored figure of *adumbrata* and very poor figure labeled *alleni* (but looking more like *athabasca*) in Holland's Moth Book (Pl. 30, figs. 34 and 35); photograph of *adumbrata*, perhaps type or compared with type, in Edwards' bound copy of Pacific Coast Lepidoptera. Genitalia: Male: Pl. 8, figs. 1-2; Female: Pl. 11, fig. 13.

This protean species is more readily recognized from Holland's colored figure or from the photographs herein than from any description, except for separation from *stretchii*. The habitus is characteristic but every character except genitalia that might be listed for separation from *divergens* falls down on one variant or another. *Stretchii* is easily confused here: the color of the hind wing, the white in the postreniform and the discal spot of the hind wing being wholly separated from the postmedian band will usually work but occasionally will give trouble. The male genitalia are the only satisfactory means of identifying questionable specimens.

The recognition of the above three names as separate races is open to considerable question, especially the segregation of *saxea* from nymotypical *adumbrata*. Nymotypical *adumbrata* (fig. 15) has the discal spot of the hind wing broadly connected to the postmedian band, whereas *saxea* (figs. 17-18) has the discal spot connected to the postmedian band only by a line of black scales along the cubital veins. Both of these vary greatly in the shade and contrast of the fore wings, and both throw dull and contrasty forms. *Alleni* (fig. 16) has the discal spot of the hind wing as in *saxea* but has a rosy flush to both wings that is lacking in more western examples.

Genitalia: The male genitalia (Pl. 8, figs. 1-2) have the left clasper broadly bifurcated, the right clasper long and single; clavus on left side very heavy, on right of normal proportions, both rather short, the basal lobes of moderate length; saccus with moderate, rather variable shelf-like projections bearing heavy setae, distally about reaching end of blunt harpé on left side; aedeagus with a large dorsal hump bearing heavy spines; vesica spined. The female genitalia (Pl. 11, fig. 13) has the dorsal sclerite of the ductus bursae moderately long, and unlike all other species except *stretchii* with lateral projections towards the vulva, these projections in turn expanding around the sides to give the appearance in ventral view of a ventral sclerite which is incomplete at the mid-ventral line (compare fig. 12). This appearance is enhanced by the presence of a constriction at the point where the dorsal sclerite gives off the two lateral arms. There is no ventral sclerite in the sense that there is in other species of this genus except *stretchii*.

Expanse: 28-38 mm.

Dates: Mostly June and July but records from April to November.

Distribution: *adumbrata adumbrata*: California, Oregon, Washington and southern British Columbia; *saxea*: Arizona, Nevada, Utah, Colorado, Wyoming, Idaho, Montana, Manitoba and eastern California; *alleni*: Colorado, Manitoba, Ontario, New York (Adirondacks), Quebec and Maine.

Early stages: Unknown although Phipps originally described the larva of *occulta* under this name (see under *occulta*).

The author collected this species commonly on the more open slopes of the upper aspen belt (upper Canadian zone) in the La Sal Mountains, Utah (elevation 9,300-9,800 ft.) in July 1933. They were collected resting among the rocks on the ground during the daytime. Normally occurring with *divergens* in the west. Dr. Phipps collected one adult of *alleni* (determined by author) visiting Blueberry blossoms in Maine.

stretchii Behr

Syneda stretchii Behr. 1870. Trans. Amer. Ent. Soc., 3: 27.

Type locality: Virginia City, Nevada (R. H. Stretch).

Types: destroyed except 1 ♂ cotype (paratype) in Field Museum. There is also a male in the Amer. Mus. Nat. Hist. that was compared with the types in Behr's collection by Henry Edwards.

Figures: Maculation: Pl. 3, fig. 19. Also photographs of both sexes given by Barnes & McDunnough in Contrib. Nat. Hist. N. A. Lepid., vol. 2, part 1, pl. 8, figs. 19-20 (compared with type in Field Museum), and a photograph in Edwards' bound copy of Pacific Coast Lepidoptera (labeled "*howlandi*" presumably following the then currently accepted synonymy proposed by Grote). Genitalia: Male: Pl. 9, figs. 1-2; Female: Pl. 11, fig. 12.

Collar concolorous or almost so; fore wing with faint black basal line, t. a. line double, excurved to submedian fold (sometimes almost straight across cell), then strongly incurved to inner margin; median space of moderate width, usually with double brown median lines; reniform brown with some black scales, shaped as in *adumbrata* (not as in *howlandi*), defined basally by a light line and distally by white which is also streaked onto veins 3 and 4; t. p. line black, excurved and angled around cell as usual, sometimes virtually touching subterminal line at veins 3 and 4, curved back to base of reniform along or just below vein 3, then outwardly oblique to inner margin (sometimes slight excurvation in submedian fold) where it is close to the subterminal line; subterminal line angled in just below costa or straight, preceded near costa by some black dashes, incurved below cell and approximate to t. p. line at inner margin; terminal line a series of crescents. Hind wing salmon-orange, black markings moderate, the discal spot not connected to the postmedian band. Beneath a salmon-pink with the usual black markings rather faint and incomplete.

This rarity is a difficult species to separate until one gets to know it. From *howlandi* (of which Grote listed it as a synonym) it is best separated by the shape of the reniform and the course of the t. p. line from vein 3 to the base of the reniform and thence to inner margin. From *adumbrata*, to which it is most nearly related, it may usually be separated by the discal spot of the hind wing; rarely specimens of *adumbrata* show a fully separate spot also and they have to be separated either by the color of the hind wing and lower side or by the white in the postreniform area or best by the male genitalia.

Genitalia: The male genitalia (Pl. 9, figs. 1-2) have the left clasper bifurcated but the parts widely separated and the costal piece sometimes rudimentary (fig. 2), clasper on right harpé single, long and pointed; clavus of left side somewhat heavier than that on right and with longer basal lobes; sacculus somewhat reduced apically on left harpé; aedaeagus with a dorsal spined swelling that is not so distinctly a "hump" as in *adumbrata*. The female geni-

talia (Pl. 11, fig. 12) are inseparable from those of *adumbrata*; compare figures 12 and 13.

Expanse: 30–38 mm.

Distribution: Scattered records from California, Nevada and Utah.

pulchra Barnes & McDunnough

Syneda pulchra Barnes & McDunnough. 1918. Contrib. Nat. Hist. N. A. Lepid., 4: 121, pl. 19, fig. 4.

Type locality: Palm Springs, Riverside Co., California, in March. Type: 1 ♂, U. S. National Museum.

Figures: Maculation: Pl. 4, figs. 1–2. Also photograph of unique type in original description. Male genitalia: Pl. 8, figs. 9–10.

A seemingly very rare species genitally forming a connecting link between the *perplexa-adumbrata-stretchii* complex and the *howlandi-tejonica-mirifica* complex. The reduced discal spot and the color of the hind wing (vermilion), the contrasting median area of the fore wing and the white in the postreniform area make confusion possible only with *howlandi* and certain females of *tejonica* (and of course *mirifica* which has however spined fore tibiae). From these *pulchra* may be distinguished by the greatly reduced discal spot and usually by the color of the hind wing; by the narrow median area, and then sometimes by the subterminal line which is usually almost straight below the costa (this subterminal line character stressed in the original description is not good, partly because some specimens of *pulchra* show it angled in below costa, and partly because occasional specimens of *stretchii* and even *howlandi* have straight subterminal lines). The postmedian band of the hind wing of *pulchra* is broad at the costa, narrow throughout the rest of its course, in some interrupted at the middle. Doubtful cases should be checked by the male genitalia.

Genitalia: The male genitalia (Pl. 8, figs. 9–10) have the claspers of the left harpé bifurcated, the parts distinct and widely separated (2 specimens) or single due to lacking the costal piece (1 specimen); clasper on right harpé long and single; clavus as usual with long basal lobe which is three to four times as long as broad; sacculus with normal shelf-like projections basally, the distal half more or less reduced on the left harpé; aedaeagus with small patch of heavy spines on dorsal side near tip but no swollen area; vesica spined. As the single female available is badly rubbed and so possibly wrongly identified the genitalia are not figured. If the determination is correct this specimen would indicate that *pulchra* has a longer

dorsal sclerite and a narrower more band-like ventral sclerite than *howlandi* and *tejonica* have.

Expanse: 35–38 mm.

Dates: March and April.

Distribution: The author has seen only five specimens including the type: 2 males from Palm Springs, Riverside Co., California; 2 males from Jacumba, San Diego Co., California, and one female, determined with slight doubt, from San Andreas Canyon, Riverside Co., California.

howlandi Grote

Syneda howlandi Grote. 1864. Proc. Ent. Soc. Phila., 3: 533–534, pl. 6, fig. 7.

Type locality: "Colorado Territory" (J. Ridings). Type: ♀ Phila. Acad. Nat. Sci.

Syneda exquisita Hampson. 1926. Lepid. Phal. N. G. & Spec. Noct., p. 41–42.

Type locality: Denver, Colorado (Osler). Type: 1 ♀, British Museum.

Figures: Maculation: Pl. 4, figs. 4–8. Also figure of *howlandi* in original description. The figure in Holland's Moth Book (Pl. 30, fig. 33) under this name seems wrongly labeled and certainly is not to be trusted for making identifications (see under *mirifica klotzi*). Genitalia: Male: Pl. 8, fig. 5; Female: Pl. 11, figs. 9–10.

Collar with two dark streaks through it; fore wing with t. a. line double, the outer line black, varying from evenly excurved to excurved in both discal and submedian folds; reniform outwardly more or less distinctly defined by white which also defines veins 3 and 4 in the postreniform area; t. p. line double, the inner line black, extending well beyond vein 3 (Cu_1) and then curved or angled back to base of reniform, oblique and excurved below cell, well separated from subterminal line at inner margin; subterminal line usually distinctly angled in above vein 7, less often incurved, rarely straight; terminal area usually without a prominent darker patch at costa by apex; cilia faintly checkered. Hind wing usually red-orange, less often (most frequently in females) reddish or even vermilion, and in two specimens from Montana yellow; discal spot light but always present, not connected with postmedian band which is moderately broad and usually complete but sometimes interrupted at the middle of the wing. Beneath the hind wing a lighter orange, the black markings lighter than above.

There are four species that might be confused with *howlandi*, namely *mirifica*, *pulchra*, *stretchii* and *tejonica* (*perfecta*). From *mirifica* this species is easily separated by the absence of spines on the fore tibiae. From *pulchra* it is best separated by the markings of the hind wing and the narrow median space of the fore wing (see under *pulchra*). From *stretchii*, which is quite likely to be confused unless examined carefully, it is separated by the course of the t. p. line and the shape of the reniform (see under *stretchii*). And from *tejonica* this species is separated chiefly by the sexes being nearly alike. In *howlandi* the hind wing is usually a reddish-orange whereas *tejonica* is more red or pink (and white in the male), but some specimens of *howlandi*, particularly females, have the hind wing just as reddish as many *tejonica* females.

The unique female type of *exquisita* is simply a brightly marked female with a red hind wing whereas the type of *howlandi* is less contrasty and with less red on the hind wing. The two forms are inseparable when long series are at hand. However, the author believes that there is a valid and distinct race of *howlandi* in the northwest (Washington) but refrains from describing it as he has only one specimen and has seen only one other (see pl. 4, fig. 8).

The *howlandi-tejonica* (*perfecta*) complex has puzzled everyone for a long time and still continues to do so. The outstanding difference between typical *howlandi* and typical *tejonica* is that in the former the sexes are alike, in the latter the sexes different. In the two other cases in which such a sexual difference occurs in different regions (*graphica* and *hudsonica*) the forms are classed as races but this case is somewhat different aside from being much more complex. For one thing there are some slight differences between the male genitalia of typical *howlandi* from Colorado and of *tejonica* from Arizona and California, and a series of intermediates tend to occur in western Texas. One might therefore postulate two species with overlapping distribution which hybridize in the zone of mingling. But this too has some objections, one of which is that males quite similar to those from Colorado are sometimes taken in southern California. All types of intermediates are to be found, principally but not exclusively in western Texas. After studying hundreds of specimens from many localities the author's only conclusion is that this is a puzzle neither to be answered in the museums nor one to be settled by ordinary collecting. It would seem answerable only by the use of genetical methods correlated with accurate field data.

Genitalia: The male genitalia (Pl. 8, fig. 5) have the claspers single; clavus long, with moderate or long basal lobes; sacculus usually more or less reduced in distal half on left harpé; aedaeagus with very minute microtrichiae on membranous dorsal side near tip; vesica spined. The female genitalia (Pl. 11, figs. 9–10) have the dorsal sclerite on the ductus bursae moderate; the ventral sclerite a narrow band definitely produced medianly.

The author has studied and compared the male genitalia of over forty specimens of the *howlandi-tejonica* complex, including a picked set of twelve males from the large series in the Barnes Collection (U. S. National Museum). In comparison with *tejonica*, typical *howlandi* from Colorado and Montana tend to have the clasper of the right harpé longer, more tapering and less often bent or bulbed at the tip; the distal part of the sacculus of the left harpé less reduced and with more of a terminal prong; and the basal lobes of the clavus longer (3–4 times as long as broad in *howlandi*, 2–3 times as long as broad in *tejonica*). Intergradés, all types and degrees of which seem to occur, are found chiefly in specimens from western Texas.

Expanse: 33–40 mm.

Dates: May, June, July and August.

Distribution: Colorado, Utah, Nevada, Nebraska, Montana, Washington (Yakima and Pateros), and some from Texas, northern New Mexico, northern Arizona and possibly California.

Early stages: Egg and larva: Dyar. Proc. U. S. Natl. Mus., 25: 382–384. 1902.

Foodplant: *Eriogonum*.

tejonica Behr

Syneda tejonica Behr. 1870. Trans. Amer. Ent. Soc., 3: 26.

Type locality: Ft. Tejon, California. Types: all destroyed, but there is one compared with type female in the Henry Edwards Collection at the Amer. Mus. Nat. Hist.

Syneda perfecta Henry Edwards. 1884. Papilio, 4: 46–47.

Type locality: Arizona. Type: 1 ♂, U. S. National Museum.

Syneda decepta Strecker. 1898. Lepid. Rhop. Heter., Suppl. 1, p. 11.

Type locality: Colorado (D. Bruce). Type: 1 ♂, Field Museum (Chicago).

Syneda nigromarginata Strecker. 1898. Lepid. Rhop. Heter., Suppl. 1, p. 11.

Type locality: Arizona (J. Doll). Type: 1 ♂, Field Museum (Chicago).

Figure: Maculation: Pl. 4, figs. 9-13. Also photographs given by Barnes & McDunnough in Contrib. Nat. Hist. N. A. Lepid., vol. 4, pl. 19, figs. 5-6, 1918, and a worthless photograph in Edwards' bound copy of Pacific Coast Lepidoptera. Male genitalia: Pl. 8, fig. 6.

Differs from other species except *howlandi* in the same way that that species does (except for the color of the hind wing of the males). From *howlandi* this species is separated by the sexual differences and in part by the locality. Also the fore wing is more contrasty, the white more distinct especially in the postreniform area, and the median and particularly the terminal areas more contrastingly bluish or bluish-grey (see under *howlandi*).

The males differ from the females in that the hind wing is more pink with white basally or the hind wing white with only a little pinkish flush in the distal half; beneath lighter, varying from white with a pink flush in the distal half to pure white. The female has the hind wing red-orange or crimson only somewhat lighter basally, same on under sides.

The name *tejonica* is based on Californian specimens in which the black markings of the undersides are light; *perfecta* is the scarcely distinct Texas form, to this author not seeming a valid race; the author has not personally seen Strecker's types but from the original descriptions and notes on the types, *nigromarginata* is the somewhat less common color form, not localized, which is distinguished by the broad black marginal bands on the undersides of both wings (see Pl. 4, fig. 11); and *decepta* is another color form with broad black bands below and distinguished from *nigromarginata* by the white hind wing with a yellow lunule at the middle of the termen of the hind wing. The type locality of *decepta* (Colorado, received from Bruce) seems peculiar and may be wrong or at least not what is today called Colorado.

The types of *tejonica* were all destroyed and the name unplaced for many years. Barnes & McDunnough (Contrib. Nat. Hist. N. A. Lepid., 4: 120-121. 1918) assigned it to its present place. This position is corroborated by a female of this species from Havilah, California, in the Henry Edwards Collection (Amer. Mus. Nat. Hist.) bearing a label in Edwards' handwriting "agrees with Behr's type. H. E." and a species label also in Edwards' handwriting "*Syneda tejonica* Behr." This specimen is the species to which Barnes & McDunnough decided the name must belong. Like all females the hind wings and undersides of this specimen are not white though they are lighter basally and could be called white more or less suffused with orange. (See Pl. 4, fig. 12.)

Genitalia: Pl. 8, fig. 6. See under *howlandi*.

Expanse: 35-42 mm., dwarfs rarely as small as 30 mm.

Dates: March, April, May, June and July.

Distribution: Texas, New Mexico, Arizona, southern Nevada, southern California and Lower California (Mexico). (Type of *decepta* labeled "Colorado.")

mirifica Henry Edwards

Syneda mirifica Henry Edwards. 1878. Pacific Coast Lepid., no. 29, p. 8.

Type locality: Virginia City, Nevada. Types: 2 ♀♀, Amer. Mus. Nat. Hist.

mirifica race *hastingsi* Henry Edwards

Syneda hastingsi Henry Edwards. 1878. Pacific Coast Lepid., no. 29, p. 8.

Type locality: Dalles, Oregon. Type: 1 ♀, Amer. Mus. Nat. Hist.

Syneda hastingsi var. *perpallida* Henry Edwards. 1881. Papilio, 1: 25-26.

Type locality: Summit Station, Sierra Nevada, California. Type: 1 ♀, Amer. Mus. Nat. Hist.

mirifica race *klotsi*, race nov. (see below)

Figures: Maculation: Pl. 4, figs. 14-18. Also colored figure of race *hastingsi* in National Geographic Magazine, 52 (1), pl. 12, fig. 6, 1927. Also the figure labeled "*howlandi*" in Holland's Moth Book (Pl. 30, fig. 33) looks certainly like this species and is probably one of the exceptionally contrasty specimens of *mirifica klotsi*. Photographs of types of *mirifica* and *hastingsi* in Edwards' bound copy of Pacific Coast Lepidoptera. Genitalia: Male: Pl. 9, figs. 7-8; Female: Pl. 11, figs. 1-5.

The most satisfactory way of separating this species from the preceding three species is by the spines at the apex of the fore tibiae. The male genitalia are usually distinct but vary in the direction of *howlandi*, sometimes puzzlingly so.

This species cannot be confused with any of the other species with spined fore tibiae. As for the races and the various names: *mirifica* is the southern and southwestern race with the maculation of the fore wing contrasty and the black markings of the hind wing light. The types of *mirifica* have the hind wing pinkish above, almost white at the base, and the undersides almost purely white (perhaps accen-

tuated by fading although the original description refers to the undersides as white). *Mirifica klotsi*, described below, is the eastern representative of the above, and is best distinguished from *mirifica mirifica* by the smaller size, the pink of the undersides of the hind wing, and the darker and less contrasty upper side of the fore wing (less white). *Mirifica hastingi* is the race in the northwest in which the fore wing is less contrasty (like *klotsi* in this respect) and the hind wing and undersides with more black, the postmedial band being of almost uniform width throughout. The name *perpallida* is an individual variant of *hastingi* in which the hind wing is yellow instead of reddish. There are two other specimens of *hastingi* in the Henry Edwards collection (Amer. Mus. Nat. Hist.) from the lot that furnished the type of *perpallida*—they are more or less intermediate in color between the types of *perpallida* and *hastingi* but nearer the latter. Also the author has a specimen of *mirifica klotsi* from Colorado with almost as nearly yellow a hind wing as the type of *perpallida*. There is no indication that *perpallida* is of racial status (as McDunnough places it in his new check list), particularly in view of the other two specimens from the same collection lot.

Genitalia: The male genitalia (Pl. 9, figs. 7–8) have the clasper of the left harpé bifurcated, the halves widely separated but in some specimens the costal piece is small or rudimentary or even absent (then resembling *howlandi*), the clasper of the right harpé single, variable in shape; clavus long with long basal lobes which are three to four times as long as broad; sacculus variable but in all slides studied with a definite terminal free prong on right harpé; aedaeagus with patch of small microtrichiae on the membranous dorsal side near the tip; vesica spined. The female genitalia (Pl. 11, figs. 1–5) have the dorsal sclerite of the ductus bursae moderately long; the ventral sclerite varying from a moderately thick band with median production (fig. 5) to a narrow sclerite (figs. 4, 3 & 1) to entirely absent (fig. 2).

Expanse: *mirifica*: 34–40 mm., usually over 36 mm.; *klotsi* & *hastingi* 28–38 mm., usually 30–35 mm.

Dates: Mostly June and July but records from April to August.

Distribution: *mirifica mirifica*: California (Loma Linda, San Bernardino Co. and Hackstaff, Modoc Co.), Nevada (Reno and Virginia City) and Utah (Eureka and Dividend). Intermediates between *mirifica mirifica* and *mirifica klotsi*: Arizona (Dewey and Paradise). *mirifica klotsi*: Colorado, New Mexico, Kansas and Nebraska. *mirifica hastingi*: northern California (Summit Station, Sierra Nevada), Oregon and Washington.

Early stages: egg and larva: Dyar. Proc. U. S. Natl. Mus., 25: 384-385. 1902. (Eggs from females caught at Denver, Colorado, accordingly race *klotsi*.)

Foodplant: *Eriogonum*.

mirifica race **klotsi**, race nov.

Figures: Maculation: Pl. 4, figs. 14-15. Female genitalia: Pl. 11, fig. 5.

Holotype male: Head, thorax and abdomen grey-brown; dark brown streaks through collar continuous with slightly lighter ones through patagia. Fore wing grey-brown, suffused with dark brown and grey scales, not contrastingly marked; basal line faint, double to middle of cell; t. a. line black, double, excurved with slight incurvation below cell and incurved below anal vein; median space grey with some brown and with two grey-brown median lines, the median area not contrasting strongly with the rest of the wing; reniform with light basal line followed by black line, filled with brown and with somewhat irregular diffuse black line outwardly, defined outwardly by white which extends along veins 3 and 4; t. p. line double, inner line black, following usual course, excurved around cell, angled out at vein 6 and at veins 3 and 4 where it is faint, incurved to base of reniform along and just below vein 3, slightly excurved in submedian fold and below anal vein; subterminal line light, defined by preceding dark ground and succeeding darker wavy line, angled in just below costa and incurved in discal and submedian folds; terminal area with dark patch at costa; faint wavy terminal line; cilia dark except at apex, with faint line through them. Hind wing salmon-red with usual discal spot; postmedian band interrupted at vein 4; terminal band separate from postmedian band at costa, narrowed at vein 5, ending at vein 2; cilia light smoky, darker at middle of termen. Beneath fore wing light with faint rosy flush; black markings as in *mirifica mirifica*; hind wing salmon-pink except along costa, veins lighter, discal spot and bands repeated from above but lighter.

Allotype female: Very nearly the same.

Other types: Similar with some variation in the degree of curving of the lines, in the shade of color of the hind wing which varies from salmon-red to faint pink and in one specimen is almost yellow, in the development of the postmedian band of the hind wing which in some specimens is complete (though narrower at middle), in others

interrupted across the cubital veins, and the contrastiness of the fore wing, most specimens having little contrast but a few being quite contrasty though none as much so as *mirifica mirifica*.

Holotype male: Fountain Valley School, Colorado Springs, Colorado, elevation 6,000 ft. (upper limit of upper Sonoran; cultivated area in otherwise arid plains), June 12, 1933. Collected by Dr. Alexander B. Klots.

Allotype female: Same data as holotype.

Paratypes: 2 ♀, same data as holotype; 1 ♀, same locality as holotype but taken July 7, 1935 (A. B. Klots); 1 ♂, Fort Collins, Colorado, June 14, 1920 (ex collection Colorado Agric. College); 1 ♀, Sedalia, Colorado, June 21, 1901 (H. G. Dyar); 3 ♂, 1 ♀, Denver, Colorado, May 28, 1901 (H. G. Dyar); 1 ♂, 1 ♀, Denver, Colorado, June 13, 1901 (H. G. Dyar); 1 ♀, Denver, Colorado, June 17, 1901 (H. G. Dyar); 1 ♂, Denver, Colorado, June 20, 1901 (H. G. Dyar); 1 ♂, 2 ♀, Denver, Colorado, no date; 1 ♀, Golden, Colorado, Aug.-Sept. (Rummel); 2 ♂, 2 ♀, Platte Cañon, Colorado, May (Oslar); 2 ♂, 13 ♀, Colorado (Bruce); 1 ♂, 4 ♀, Colorado (various sources but no further data); 1 ♀, Garden City, Kansas, June 10, 1935 (H. B. Walkden); 1 ♂, Deming, New Mexico; 1 ♂, Mesilla, New Mexico.

Location of types: Holotype, allotype and most of the paratypes in the collection of the U. S. National Museum; other paratypes in the collections of the American Museum of Natural History, British Museum, Canadian National Collection, Los Angeles Museum, Cornell University and of the author.

Distribution: Colorado, Nebraska, Kansas and New Mexico. Intermediates to *mirifica mirifica* in eastern Arizona.

This eastern or Rocky Mountain race is readily distinguished from race *hastingsi*, which it resembles in coloration of the fore wing, by the light postmedian band of the hind wing which becomes greatly narrowed or interrupted at the center. From *mirifica mirifica*, with which it intergrades in eastern Arizona, it is separated by the salmon-pink of the undersides of the hind wings and the more uniformly colored fore wing. The type of *mirifica mirifica* has the undersurfaces of the hind wing white or nearly so and the basal half of the upper surfaces of the hind wing white and the distal half with only a pink flush, but many specimens of *mirifica mirifica* have the entire upper surface of the hind wing uniformly reddish and only slightly lighter basally; accordingly this character is not adequate for the separation of race *klotsi*. Occasional specimens of *mirifica mirifica* also show a pinkish tinge to the undersides of the hind wings but always have very contrasty fore wings. Also race *klotsi* averages smaller than *mirifica*.

eubapta Hampson

Drasteria eubapta Hampson. 1926. Lepid. Phal. N. G. & Spec. Noct., p. 38-39.

Type locality: Yuma, Arizona (Clemence). Types: 1 ♂, 1 ♀, British Museum.

Figures: Maculation: Pl. 4, fig. 19. Genitalia: Male: Pl. 9, figs. 5-6; Female: Pl. 11, fig. 6.

A very rare species which may be distinguished from the other species with spined fore tibiae by the pure white hind wing and undersides, and by the fuscous postmedian band of the hind wing which extends to the termen at the costal margin and is connected with the faint discal spot and contrasts with the black spot at the termen between veins 2 and 4 (M_3 and Cu_2). The cilia of the fore wing are also distinctly checkered (white and rufous). A full description of the maculation is given by Hampson.

Genitalia: The male genitalia (Pl. 9, figs. 5-6) are not clearly separable from slides of the male genitalia of *mirifica* (q. v.). The female genitalia (Pl. 11, fig. 6) also are not separable from those of *mirifica* (q. v.).

Expanse: 30-38 mm.

Distribution: There are only nine specimens (3 ♂♂, 6 ♀♀) known. The author has studied five of these (2 ♂♂, 3 ♀♀). There are 2 ♂♂ and 3 ♀♀ collected by Clemence at Yuma, Arizona, April, 1910, one pair of which furnished Hampson's types, the other three specimens now being in the Canadian National Collection (ex Dod Collection); and 1 ♂ and 3 ♀♀ collected by Willett in the Imperial Valley, Imperial Co., California, March 10, 1932 (now in the collection of the Los Angeles Museum).

graphica Hübner

Drasteria grafica Hübner. 1808. Erste Zutraege Exot. Schm., p. 3 (non descr., cites figs. 11 & 12 not yet published); 1809. Zweite Zutr. Exot. Schm., figs. 11 & 12 (non. nom.); 1818. Zweite Zutr. Exot. Schm., 1: 18.

Type locality: Georgia. Types: lost but figured.

Euclidia capiticola Walker. 1858. Cat. Br. Mus., Heter., 14: 1461-1462.

Type locality: East Florida. Type: British Museum.

Syneda grafica var. *media* Morrison. 1875. Proc. Boston Soc. Nat. Hist., 18: 125.

Type locality: Florida. Type: Meyer Coll. (unknown to present author).

Syneda faceta Henry Edwards. 1881. *Papilio*, 1: 119.

Type locality: Indian River, Florida. Type: 1 ♀, Amer. Mus. Nat. Hist. (Not ♂ as given in original description and catalogue of American Museum types.)

graphica race *atlantica* Barnes & McDunnough

Drasteria grafica race *atlantica* Barnes & McDunnough. 1918.

Contrib. Nat. Hist. N. A. Lepid., 4: 118-119, pl. 19, figs. 1-2.

Type locality: Rock Beach, L. I., N. Y. Types: ♂ & ♀, U. S. National Museum.

Figures: Maculation: Pl. 5, figs. 1-3. Also colored figure of male in Holland's Moth Book (Pl. 30, fig. 30), and in original description of *graphica*. Photographs given by Barnes & McDunnough, Contrib. Nat. Hist. N. A. Lepid., vol. 4, pl. 19, figs. 1-2, 1918. Colored figure of larva (after Abbott MS) by Guenée, Sp. Gen. Noct., vol. 3, pl. 2, fig. 10, 1852. Genitalia: Both sexes figured in generic revision (Richards, 1936c).

The male of the nymotypical form and both sexes of *atlantica* may be readily recognized by Holland's colored figure, and all the forms by the photographs given by Barnes & McDunnough and herein. Southern females have the markings of the fore wings greatly reduced or obscured; they may be separated from all other nearly immaculate forms by the subterminal line which is represented by a series of light points on the veins and by the hind wing both above and below. Hind wing yellow and black; in some southern specimens reddish and black.

This species differs from its nearest congener, *occulta* Hy. Edw., by the subterminal line being a series of light, more or less connected spots (*graphica grafica*) or a light line defined by the preceding dark ground color and by a succeeding faint or distinct brown or greyish line (*graphica atlantica*), but some specimens of *atlantica* have this outer line nearly or quite obsolete.

Genitalia: The male genitalia (figured in generic revision, Richards, 1936c) have short harpés which are oblique at the apex; claspers single; clavus moderate with moderate basal lobes; sacculus well developed; aedaeagus without external spines; vesica spined. The female genitalia (see generic revision for figure) have the dorsal sclerite of the ductus bursae long; the ventral sclerite long and broad, with a slight median projection.

Expanse: 30–36 mm.

Dates: March to May in south; April to June and August in north.

Distribution: *graphica graphica*: southern Atlantic states, specimens seen from Florida, Georgia and North Carolina. *graphica atlantica*: northern Atlantic states, specimens seen from Massachusetts, Long Island (New York), Staten Island (New York) and New Jersey,

Early stages: Colored figure of larva (after Abbott MS) given by Guenée (Sp. Gen. Noct., vol. 3, p. 72, pl. 2, fig. 10. 1852). Larva of *occulta* erroneously described as of this species by Phipps and by Crumb (see under *occulta*).

This species is found mostly among the coastal sand dunes and flying out over the adjacent salt marshes.

occulta Henry Edwards

Syneda occulta Henry Edwards. 1881. Papilio, 1: 118–119.

Type locality: Recorded as Texas, see below. Type: 1 ♀, U. S. National Museum.

Figures: Maculation: Pl. 5, fig. 4. Also colored figure given by Phipps, Maine Agric. Expt. Sta., Bull. 356, 1930; and photograph by Barnes & McDunnough, Contrib. Nat. Hist. N. A. Lepid., vol. 4, pl. 19, fig. 3, 1918.

Differs from *graphica atlantica* by the more even appearance and by the subterminal line which is defined *only* by the contrast of the preceding dark ground color with the succeeding light terminal area. There seem to be no appreciable constant differences between the male and female genitalia of *occulta* and those of *graphica*, but the maculation is sufficiently different to warrant continuing to class them as distinct species.

Expanse: 32–38 mm.

Dates: May in New Jersey. June in New York and Maine.

Distribution: Maine, Massachusetts, New York (Long Island), New Jersey and Pennsylvania. The unique type of this species is labeled "Texas" (collected by J. Boll) but the present author questions this locality label as the many specimens he has studied have all been collected from Maine to Pennsylvania.

Early stages: Larva described first as "*alleni*," then as "*graphica*" but Dr. Phipps loaned the author his entire bred series and they are all typical *occulta* as also is the colored figure he published. However, as implied above, *graphica* and *occulta* may possibly not be distinct species although they appear to be. For description of

larva see: Phipps, C. R., Journ. Econ. Ent., 22: 137-140, 1929 (under name of "*alleni*"); Phipps, C. R., Bull. 356, Maine Agric. Expt. Sta., pp. 176-178, 1930 (under name of "*graphica*"); and Crumb, S. E., Bull. Brook. Ent. Soc., 27: 80, 1932 (larvae from Phipps; under name of "*graphica*").

Foodplant: Blueberry, a minor pest in Maine (Phipps).

ingeniculata Morrison

Syneda ingeniculata Morrison. 1875. Proc. Acad. Nat. Sci. Phila., 27: 435.

Type locality: Dallas, Texas. Type: Museum Comparative Zoology (Harvard).

Figures: Maculation: Pl. 5, figs. 5-6. Also photograph by Barnes & McDunnough in Contrib. Nat. Hist. N. A. Lepid., vol. 2, part 1, pl. 5, fig. 1, 1913. Male genitalia: Pl. 9, fig. 4.

Another rare and distinctive species. Even without looking for the spines on the fore tibiae it cannot be confused with anything else. Thorax and ground color of the fore wings bluish-grey; collar with two dark streaks; basal line double; t. a. line double, oblique to below cell then incurved; median area broad, not strongly contrasting; reniform defined only by preceding black basal line and black spot in center of outer edge; postreniform area small and concolorous; t. p. line not strongly angled out on veins 3, 4 and 6; subterminal line an irregular faint light line; terminal line reduced to a series of points between the veins; cilia and terminal area concolorous. Hind wing salmon-pink with the usual black markings.

Genitalia: The male genitalia (Pl. 9, fig. 4) have long rounded harpes; claspers single (in some slides with faint indication of what may be rudimentary costal piece to left clasper); clavus long with long basal lobes; sacculus with moderate shelf-like projection, on left harpé this is separate from the narrow marginal band-like distal part of the sacculus which lacks a terminal prong. The female genitalia are similar to those of *graphica* and *occulta*.

Expanse: 38-42 mm.

Distribution: Texas and Kansas.

Bulia Walker (= *Cirrhobolina* Grote)

A full revision of this genus with keys, descriptions, references and figures of genitalia has already been published (Richards, 1936b). Photographs and a new race are given herein.

confirmans Walker

Figures: Maculation: Pl. 5, figs. 7-9.

Distribution: Cuba, Jamaica, Haiti, San Domingo, Marguerite Island, British Guiana, Costa Rica and Venezuela.

similaris Richards

Bulia similaris Richards. 1936. Ann. Ent. Soc., Amer., 29: 433-434, figs. 8-9.

Type locality: San Benito, Texas. Types: ♂ & ♀, U. S. National Museum.

Figures: Maculation: Pl. 5, figs. 13-14.

Distribution: Texas and Baboquivari Mountains, Arizona.

At the time of description of this species the author noted that the specimens from California deserts were of distinct appearance and, to quote, were "perhaps worthy of a racial name." Since then a considerable number of additional specimens have been seen from other localities in the southwest, and these lead the author to propose a separate racial name for the specimens from the deserts of western Arizona, southern California and Lower California (Mexico).

similaris race **californica**, race nov.

This race (Pl. 5, fig. 14) is distinguished from the dark nymotypical race from Texas by the lighter color and slightly larger size. In the males the ground color of the fore wings is light cream (instead of dark brown) with black or dark brown maculation and some sprinkling of dark scales. In the female the fore wing is much more mottled in appearance; the ground color usually a light cream; the markings faint or obsolete; reniform distinct, sometimes filled in solidly with fuscous and then being a contrasting dark blotch on a light wing; frequently with light brown between reniform and t. p. line, below reniform and in terminal area (similar to variant *vulpina* of *deducta*).

This race is not as well differentiated in the male sex as in the female; accordingly a female has been selected as holotype.

Holotype female: Jacumba, San Diego Co., California, April 28, 1935 (G. P. Engelhardt); in collection U. S. National Museum.

Allotype male: Loma Linda, San Bernardino Co., California, April 16-23. (ex Barnes collection, in collection of American Museum of Natural History.)

Paratypes: The Californian specimens made paratypes of *similaris*, viz.: 7 ♂♂, 5 ♀♀, Loma Linda, San Bernardino Co., California, April and May; 1 ♂, 1 ♀, Palm Springs, Riverside Co., California,

April 16-23; 1 ♂, Sheep Creek, San Gabriel Mountains, California, April 25, 1931; and 1 ♀, San Diego Co., California, April.

Additional paratypes: 2 ♀♀, Indian Wells, Coachella Valley, California, April 26, 1938 (Miss P. W. Work); 2 ♀♀, same locality, April 29, 1938; 2 ♀♀, Cathedral City, Riverside Co., California, late April, 1938 (Miss P. W. Work); 1 ♀, Arizona; 2 ♂♂, 1 ♀, "Rosarito," Lower California, Mexico; 2 ♀♀, "Punta Prieta," Lower California, Mexico; 2 ♂♂, Jacumba, San Diego Co., California, April 28, 1935 (G. P. Engelhardt).

The author has also seen a dozen or so more specimens of this race in various collections.

Paratypes distributed to the U. S. National Museum, American Museum of Natural History, British Museum, Los Angeles Museum, Canadian National Collection, Cornell University Collection, and the collections of Mrs. V. H. Dos Passos and the author.

deducta Morrison

Figures: Maculation: Pl. 5, figs. 10-12. Also colored figures in Holland's Moth Book (Pl. 30, fig. 36) and in the National Geographic Magazine, vol. 52, no. 1, pl. 12, fig. 3, 1937.

Distribution: Arkansas, Colorado, Texas, New Mexico, Utah, Arizona, California and Mexico.

Foodplant: Mesquite (*Prosopis* sp.), bred by S. E. Crumb.

Boryzops Richards

purissima Dyar

Iscaidia purissima Dyar. 1911. Proc. U. S. Natl. Mus., 38: 252.

Type locality: Misantla, State of Vera Cruz, Mexico. Type: 1 ♀, U. S. Natl. Mus.

Figures: Maculation: Pl. 5, fig. 20. Also colored figure of type given by Hampson, Cat. Lepid. Phal., vol. 11, pl. 186, fig. 15, 1912. Male genitalia: figured in generic revision (Richards, 1936c).

Since recording this species from a single specimen from Florida City, Florida (Richards, 1937), the author has seen another specimen from the same locality (in collection of Mr. Otto Buchholz) and has heard from Dr. F. M. Jones that he and Dr. Blatchley caught three specimens at the Royal Palm State Park, Florida, at bait in March and April.

The photograph published herein was kindly furnished by Dr. Jones.

Lois Dyar

lorina Druce

Polia (?) *lorina* Druce. 1890. Proc. Zool. Soc., p. 515.

Type locality: Presidio de Mazatlan, Mexico. Type: British Museum.

Catocala juanita Schaus. 1894. Trans. Amer. Ent. Soc., 21: 241.

Type locality: Paso de San Juan, Mexico. Type: U. S. National Museum.

Figures: Maculation: Pl. 5, fig. 19. Also colored figure given by Druce in Biol. Centr. Amer., Heterocera, vol. 2, pl. 94, fig. 15.

The synonymy is from Barnes & Benjamin (Proc. Ent. Soc. Wash., 28: 20. 1926). These authors doubtfully recorded this species from Florida. A single specimen has subsequently been captured at bait by Dr. W. S. Blatchley at the Royal Palm State Park, Florida, on April 12, 1927.

The photograph published herein was kindly furnished by Dr. Jones, who also furnished the author with the above record.

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PLATE I

(All figures on this plate reduced to about seven-eighths natural size)

- Fig. 1. *Phoberia atomaris* Hbn. ♂. Specimen from Omaha, Nebraska, March 23, 1918 (R. A. Leussler).
- Fig. 2. *Litocala sexsignata* Harv. ♂. (This specimen the one of Edwards' cotypes that bears the type label of var. *deserta*.) Normally this species has less contrasty median and postreniform areas. Specimen from Arizona (in collection Amer. Mus. Nat. Hist.).
- Fig. 3. *Cissusa* (*Cissusa*) *spadix* Cramer. ♀. Specimen from Mississippi (Amer. Mus. Nat. Hist.).
- Fig. 4. *Cissusa* (*Cissusa*) *mucronata* Grote. ♀, compared with type. Specimen from McMinnville, Oregon, March 31, 1930.
- Fig. 5. *Cissusa* (*Cissusa*) *indiscreta* Hy. Edw. ♀, compared with type (t. a. and t. p. lines slightly heavier in type). Specimen from Paso Robles, San Luis Obispo Co., California, 3-5-38 (V. L. Clemence).
- Fig. 6. *Cissusa* (*Ulosyneda*) *valens* Hy. Edw. ♂. Females have the lines faint and with little or no suffusion around them. Specimen from Colorado, March.
- Fig. 7. *Melipotis* (*Lynecestis*) *acontioides* Gn. ♀. Specimen from Nevada, Iowa, May 29, 1915.
- Fig. 8. *Melipotis* (*Melipotis*) *agrotoides* Wlk. ♀. Cilia of hind wing all white, not visible in this photograph. Specimen from Brownsville, Texas, March 11 (Geo. Dorner).
- Fig. 9. *Melipotis* (*Melipotis*) *agrotoides* Wlk. ♂. Cilia of hind wing all white, not visible in this photograph. Specimen from San Benito, Texas, May 1-7.
- Fig. 10. *Melipotis* (*Melipotis*) *novanda* Gn. ♂. Cilia of hind wing mostly white, not visible in this photograph. Specimen from Hereford, Arizona, Sept. 22 (Barnes Collection).
- Fig. 11. *Melipotis* (*Melipotis*) *novanda* Gn. ♀. Cilia of hind wing mostly white, not visible in this photograph. Specimen from Baboquivari Mtns., Pima Co., Arizona, Sept. 15-30, 1923 (O. C. Poling, in Barnes Collection).
- Fig. 12. *Melipotis* (*Melipotis*) *contorta* Gn. ♂. White cilia not visible. Specimen from Indian River, Florida (ex Slosson Collection).
- Fig. 13. *Melipotis* (*Melipotis*) *contorta* Gn. ♀. White cilia not visible. Specimen from Biscayne Bay, Florida (ex Slosson Collection).



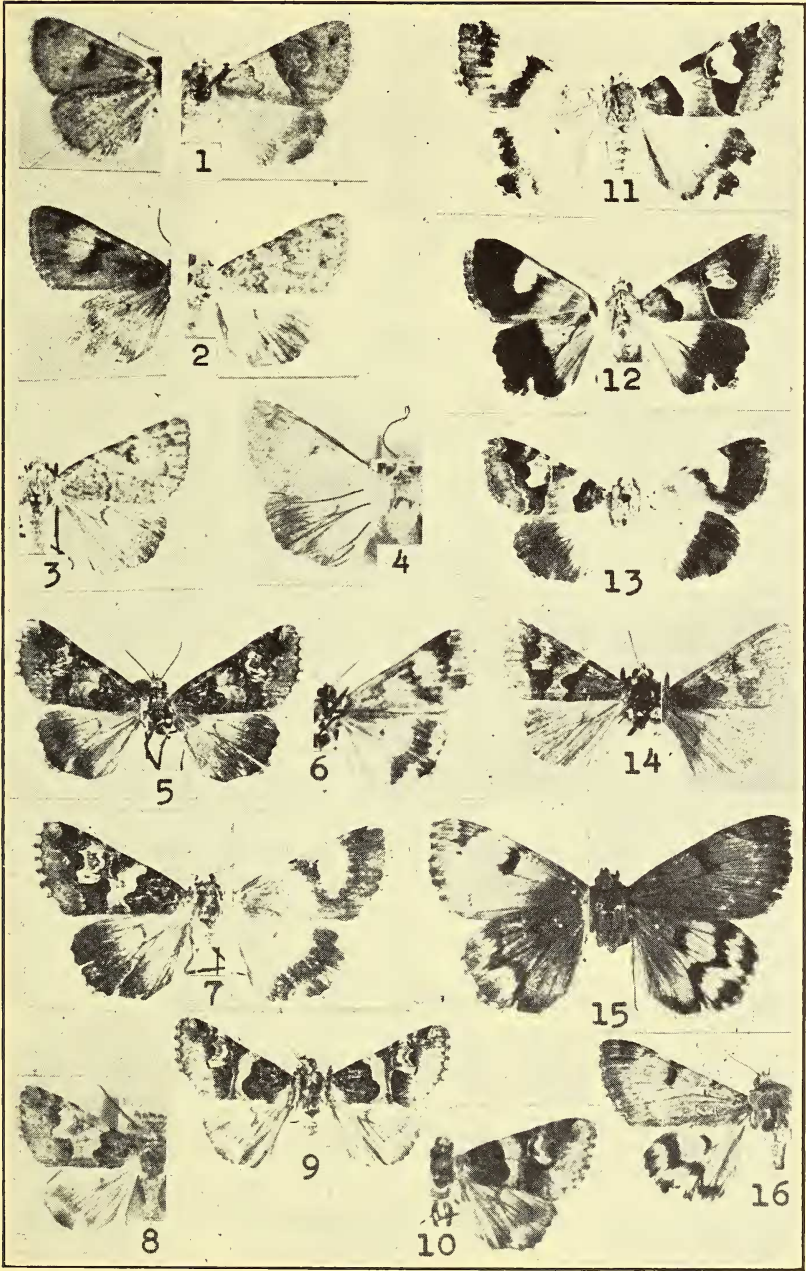
- Fig. 14. *Melipotis (Melipotis) prolata* Wlk. ♂. An excellent photograph. Females slightly larger and even more solidly black and immaculate. Specimen from Florida (ex Slosson Collection).
- Fig. 15. *Melipotis (Melipotis) januaris* Gn. ♂. Great variation in amount of contrast and strength of markings. Specimen from Florida City, Florida, July 20, 1934 (Mrs. L. E. Forsyth).
- Fig. 16. *Melipotis (Melipotis) januaris* Gn. ♀. Very variable (see text). Specimen from Miami, Florida, July 18, 1934 (Mrs. L. E. Forsyth).
- Fig. 17. *Melipotis (Melipotis) famelica* Gn. ♀. The characteristic green scales in the reniform naturally do not show. Specimen from Florida City, Florida, March 17, 1934 (Mrs. L. E. Forsyth).
- Fig. 18. *Melipotis (Melipotis) famelica* Gn. ♂. Specimen from Royal Palm State Park, Florida (photograph by courtesy of Dr. F. M. Jones).
- Fig. 19. *Melipotis (Melipotis) jucunda* Hbn. ♂. Technically this would be race *hadeniformis* though probably not same color form. Considerable variation but t. p. line always as here. Specimen from Olinda, California, June 24, 1933 (E. Walter).
- Fig. 20. *Melipotis (Melipotis) jucunda* Hbn. ♀. (This specimen is the unique type of "*Cirrhopolina tetrica* Hy. Edw.") Some females more maculate; t. p. line as in male.
- Fig. 21. *Melipotis (Melipotis) indomita* Wlk. ♂. Photograph too dark but does show maculation except interruption of t. p. line on veins 3, 4 and 6. Specimen from San Antonio, Texas, July 5, 1928.
- Fig. 22. *Melipotis (Melipotis) indomita* Wlk. ♀. Most specimens somewhat lighter. Specimen from San Antonio, Texas, June 10, 1933 (G. P. Engelhardt).
- Fig. 23. *Melipotis (Melipotis) fasciolaris* Hbn. ♂. Specimen from Jalapa, Mexico.
- Fig. 24. *Melipotis (Melipotis) fasciolaris* Hbn. ♀. Note t. a. line barely visible; the contrasting line is the medial line (compare ♂). Specimen from Orizaba, Vera Cruz, Mexico, June (Kearfott Collection, Amer. Mus. Natl. Hist.).
- Fig. 25. *Melipotis (Melipotis) cellaris* Gn. ♂. Sexes alike. Specimen from Brownsville, Texas, 2-11 (Geo. Dörner).

- Fig. 26. *Melipotis (Melipotis) perpendicularis* Gn. ♂. Unusually small specimen, also median area frequently broader. Specimen from Royal Palm State Park, Florida (photograph by courtesy of Dr. F. M. Jones).
- Fig. 27. *Melipotis (Melipotis) perpendicularis* Gn. ♀. A large, strongly maculate specimen (similar to drawing of type of *stygialis* Grote). Specimen from Hereford, Arizona (Barnes Collection).
- Fig. 28. *Melipotis (Melipotis) perpendicularis* Gn. ♀. (This specimen the type of *brunnearis* Gn., British Museum.) Shows type of immaculate maculation of this species. (Photograph by courtesy of Mr. W. H. T. Tams.)
- Fig. 29. *Melipotis (Melipotis) nigrobasis* Gn. ♂. Note subterminal line defined by only preceding black dashes near costa. Specimen from Brownsville, Texas, 2-11 (Geo. Dorner, in Barnes Collection).
- Fig. 30. *Melipotis (Melipotis) nigrobasis* Gn. ♀. Specimen from San Benito, Texas, Aug. 1-7 (Barnes Collection).
- Fig. 31. *Panula inconstans* Gn. ♂. Upper side on right, under side of same on left. Note solid brown hind wing and undersides. Female with markings light or obsolescent. Specimen from Pétionville, Haiti (O. Fulda).
- Fig. 32. *Forsebia perlaeta* Hy. Edw. ♀. This specimen light but some have subterminal and terminal areas dark (compare fig. 33). Specimen from Bill Williams Fork, Arizona, August (F. H. Snow).
- Fig. 33. *Forsebia parlaeta* Hy. Edw. ♂. Upper side on right, under side of same on left. Species varies from light grey to quite dark but never immaculate in male; median area contrastingly ochreous; hind wing white. Specimen from Wenden, Yuma Co., Arizona, July 5-13.
- Fig. 34. *Asyneda mendozina* Hmps. ♂, holotype (British Museum). The female of this species is nearly immaculate. (Photograph by courtesy of Mr. W. H. T. Tams.)
- Fig. 35. *Ianius mosca* Dyar ♀. Note small white orbicular spot. Sexes alike. Specimen from Alpine, Texas, Aug. 1-6, 1926 (O. C. Poling, in Barnes Collection).

PLATE II

(All figures on this plate natural size)

- Fig. 1. *Drasteria (Synedoida) scrupulosa* Hy. Edw. ♀, cotype (Amer. Mus. Nat. Hist.). Upper side on right, under side of same on left.
- Fig. 2. *Drasteria (Synedoida) inepta* Hy. Edw. ♀, cotype (Amer. Mus. Nat. Hist.). Upper side on right, under side of same on left (photograph of under side printed darker than upper side). Specimen from "Southern Colorado."
- Fig. 3. *Drasteria (Synedoida) inepta* Hy. Edw. ♀. (This specimen a cotype of *morbosa* Hy. Edw.) Specimen from "Southern Colorado."
- Fig. 4. *Drasteria (Synedoida) inepta* Hy. Edw. ♀. (This specimen the holotype of *violescens* Hmps., British Museum.) (Photograph by courtesy of Mr. W. H. T. Tams.)
- Fig. 5. *Drasteria (Synedoida) sabulosa* Hy. Edw. ♀, cotype (labeled "Type 2") (Amer. Mus. Nat. Hist.). A dark print; the specimen is grey, not brown.
- Fig. 6. Undersides of preceding (figure 5).
- Fig. 7. *Drasteria (Synedoida) sabulosa abrupta* B. & McD. ♀, compared with types. Upper side on left, under side of same on right. Specimen from "Arizona, 1923."
- Fig. 8. *Drasteria (Synedoida) nichollae* Hmps. ♀, holotype British Museum (photograph by courtesy of Mr. W. H. T. Tams).
- Fig. 9. *Drasteria (Synedoida) nichollae garthi*, race nov. ♂, holotype (see description).
- Fig. 10. *Drasteria (Synedoida) nichollae garthi*, race nov. ♀, allotype. Print rather poor, see description.
- Fig. 11. *Drasteria (Synedoida) pallescens* G. & R. ♂. Upper side on right, under side of same on left. Thorax and base of fore wing pinkish-grey; hind wing black and white. Specimen from Jacumba, San Diego Co., California, April 28, 1933 (G. P. Engelhardt).
- Fig. 12. *Drasteria (Synedoida) pallescens* G. & R. ♀. Upper side on right, under side of same on left. Specimen from Globe, Arizona, July 6, 1935 (Parker).
- Fig. 13. *Drasteria (Synedoida) fumosa brunneifasciata* B. & McD. ♀, compared with types. Upper side on left, under side



of same on right. Specimen from Mt. Lowe, California, Aug. 1, 1924.

- Fig. 14. *Drasteria (Synedoida) biformata* Hy. Edw. ♀, cotype (Amer. Mus. Nat. Hist.). Specimen somewhat rubbed as can be seen particularly near apex of fore wing. Upper side on left, under side of same on right. Lighting from behind causes maculation of upper side to show faintly on lower view.
- Fig. 15. *Drasteria (Synedoida) ochracea* Behr. ♀. Upper side on right, under side of same on left. Specimen from Wallace, Idaho, May 16, 1930 (O. Huelleman).
- Fig. 16. *Drasteria (Synedoida) ochracea* Behr. ♂. Hind wing of this specimen visibly torn at center. Specimen from Globe, Arizona.

PLATE III

(All figures on this plate natural size)

- Fig. 1. *Drasteria (Synedoida) divergens* Behr. ♂. Upper side on right, under side of same on left. Hind wing yellow and black. Specimen from Wallace, Idaho, Aug. 6, 1931 (O. Huelleman). (Compare Pl. 2, figs. 7 and 13.)
- Fig. 2. *Drasteria (Synedoida) divergens* form *socia* Behr. ♂. Hind wing yellowish with pink cast. Specimen from Los Angeles Co., California, Sept. 7, 1930 (J. A. Comstock).
- Fig. 3. *Drasteria (Drasteria) petricola petricola* Wlk. ♂. Upper side on right, under side of same on left. Note black on veins in terminal area on under sides. Specimen from La Sal Mtns., Utah, July 20, 1936 (A. B. Klotz).
- Fig. 4. *Drasteria (Drasteria) petricola athabasca* form *crockeri* B. & Benj. ♀. Upper side on right, under side of same on left. Specimen from Beulah, Manitoba.
- Fig. 5. *Drasteria (Drasteria) hudsonica hudsonica* G. & R. ♂, type (Phila. Acad. Nat. Sci.). Upper side on right, under side of same on left. (Photograph by courtesy of Mr. J. W. Cadbury.)
- Fig. 6. *Drasteria (Drasteria) hudsonica* race (?) *seposita* Hy. Edw. ♀, cotype (labeled "Type 2," Amer. Mus. Nat. Hist.). The brown median shade line scarcely shows here.



- Fig. 7. *Drasteria (Drasteria) hudsonica* race. ♀. This is the specimen referred to in the text as probably representing *nubicola* Behr and *maculosa* Behr (see text).
- Fig. 8. Underside of preceding (fig. 7).
- Fig. 9. *Drasteria (Drasteria) hudsonica heathi* B. & McD. ♂. (This specimen the holotype of *pedionis* Hmps., British Museum.) (Photograph by courtesy of Mr. W. H. T. Tams.)
- Fig. 10. *Drasteria (Drasteria) hudsonica heathi* var. ♂. A large variant of the plains race. Upper side on right, under side of same on left. Specimen from Clear Lake, Cherry Co., Nebraska, July 25, 1911 (F. H. Shoemaker).
- Fig. 11. *Drasteria (Drasteria) hudsonica heathi* B. & McD. ♀. Specimen from Hebron, North Dakota, Aug. 12, 1930.
- Fig. 12. *Drasteria (Synedoida) edwardsi* Behr. ♂. Upper side on left, under side of same on right. Specimen from Menlo Park, California, May 24, 1932 (Kusche).
- Fig. 13. *Drasteria (Drasteria) perplexa* Hy. Edw. ♂. Upper side on right, under side of same on left. A lightly colored specimen from Paonia, Colorado, 1-5-1927.
- Fig. 14. *Drasteria (Drasteria) perplexa* Hy. Edw. ♂. Upper side on right, under side of same on left. A dark specimen from Paonia, Colorado, 6-19-1925.
- Fig. 15. *Drasteria (Drasteria) adumbrata adumbrata* Behr. ♂. Upper side on right, under side of same on left. Hind wing yellow and black. Specimen from Deerpark, Placer Co., California, July 13, 1909 (E. J. Newcomer).
- Fig. 16. *Drasteria (Drasteria) adumbrata alleni* Grote. ♂. Upper side on left, under side of same on right. Specimen from Mt. Katahdin, Maine, June 29, 1938 (A. B. Klots).
- Fig. 17. *Drasteria (Drasteria) adumbrata saxea* Hy. Edw. ♀, co-type (Amer. Mus. Nat. Hist.). Specimen from Colorado.
- Fig. 18. *Drasteria (Drasteria) adumbrata saxea* Hy. Edw. ♂. Contrasty, light specimen from vicinity of Warner Ranger Station, La Sal Mtns., Utah, elev. 9200 ft., July 8, 1933 (A. G. Richards, Jr.).
- Fig. 19. *Drasteria (Drasteria) stretchii* Behr. ♂. (This specimen labeled "Agrees with Behr's type, Henry Edwards." Amer. Mus. Nat. Hist.). Upper side on right, under side of same on left. Specimen from Nevada (Edwards' Collection number 14959).

PLATE IV

(All figures on this plate natural size)

- Fig. 1. *Drasteria* (*Drasteria*) *pulchra* B. & McD. ♂, compared with type. The vermilion hind wing photographed white in this light print. Specimen from Jacumba, San Diego Co., California, April 28, 1935 (G. P. Engelhardt).
- Fig. 2. Underside of preceding (fig. 1) printed quite dark to bring out the faint discal spot.
- Fig. 3. *Drasteria* (*Aleucanitis* ?) *grandirena* Haw. ♀. Hind wing and undersides black and white. Upper side on right, under side of same on left. Specimen from Big Indian Valley, Catskill Mtns., N. Y., July 28, 1913 (R. F. Pearsall).
- Fig. 4. *Drasteria* (*Drasteria*) *howlandi* Grote. ♀. A light print of the normal form; hind wing reddish-orange. Specimen from Fountain Valley School, Colorado Springs, Colorado, July 20, 1933 (L. E. Chadwick).
- Fig. 5. *Drasteria* (*Drasteria*) *howlandi* Grote. ♀. (This specimen the holotype of *exquisita* Hmps., British Museum.) (Photograph by courtesy of Mr. W. H. T. Tams.)
- Fig. 6. *Drasteria* (*Drasteria*) *howlandi* Grote. ♂. Upper side on right, under side of same on left. Hind wing almost yellow in this specimen. Specimen from Miles City, Montana, July 27, 1932.
- Fig. 7. *Drasteria* (*Drasteria*) *howlandi* var. ♀. A contrasty specimen, the color values good in this photograph (compare fig. 5). Upper side on right, under side of same on left. Specimen from Colorado (Amer. Mus. Nat. Hist.).
- Fig. 8. *Drasteria* (*Drasteria*) *howlandi* race. ♀. Upper side on left, under side of same on right. Specimen from Pateros, Washington, April 21, 1930 (see text).
- Fig. 9. *Drasteria* (*Drasteria*) *tejonica* Behr. ♂. Upper side on left, under side of same on right. Specimen from Dixieland, Imperial Co., California, April 20, 1922 (O. C. Poling).
- Fig. 10. *Drasteria* (*Drasteria*) *tejonica* var. ♂. Unique in the course of the t. a. line and the narrowness of the median space. The black banding of the hind wing and under sides are as in the synonymous *nigromarginata*. Specimen

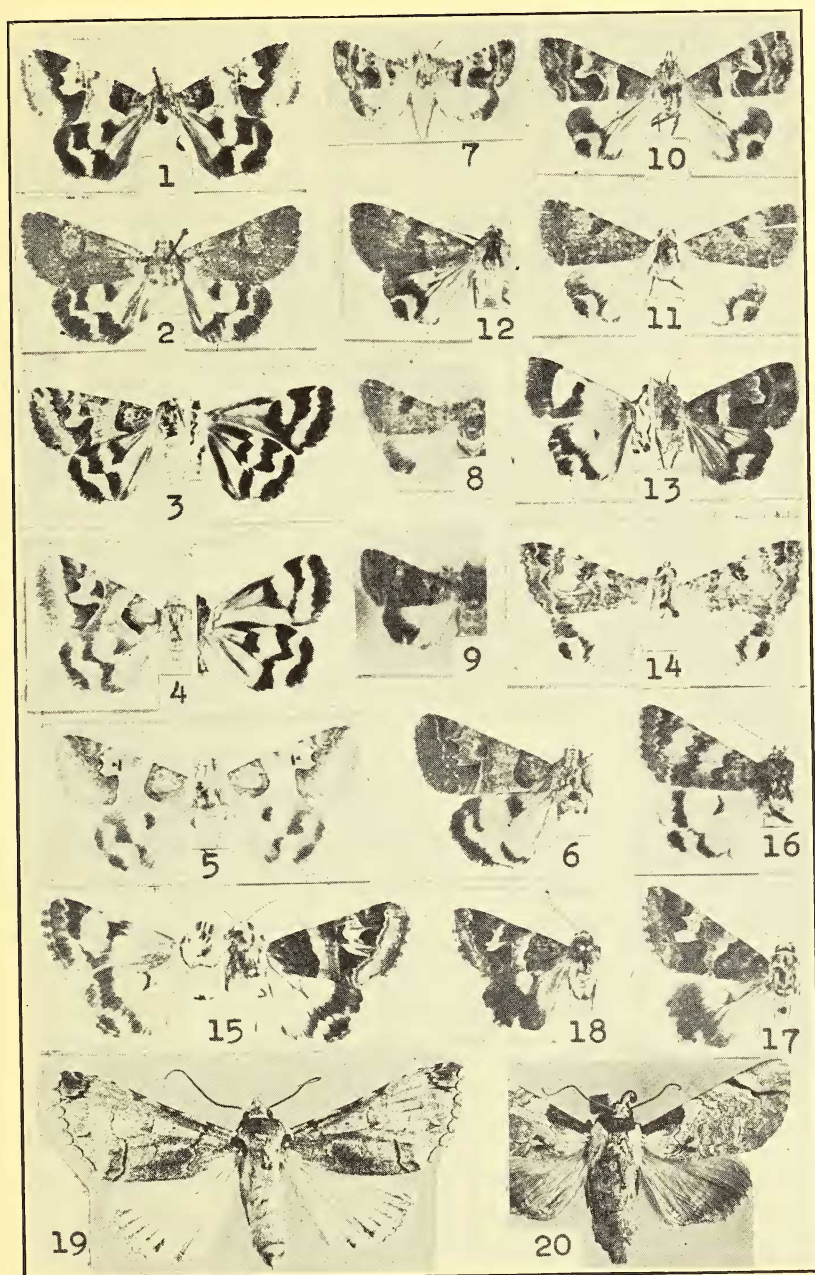


- men from "Rosarito," Lower California, Mexico, March 28, 1935 (ex collection Mrs. V. H. Dos Passos).
- Fig. 11. Under sides of preceding printed somewhat darker (fig. 10).
- Fig. 12. *Drasteria (Drasteria) tejonica* Behr. ♀. (This specimen labeled "Agrees with Behr's type, Henry Edwards." Amer. Mus. Nat. Hist.). Upper side on right, under side of same on left. Specimen from Havilah, California (Edwards' Collection number 14981).
- Fig. 13. *Drasteria (Drasteria) tejonica* Behr. ♀. Shows maculation of fore wing better than preceding. Specimen from Yuma, Arizona, April 25, 1935 (G. P. Engelhardt).
- Fig. 14. *Drasteria (Drasteria) mirifica klotsi*, race nov. ♂, holotype. Upper side on right, under side of same on left.
- Fig. 15. *Drasteria (Drasteria) mirifica klotsi*, race nov. ♀, allotype.
- Fig. 16. *Drasteria (Drasteria) mirifica hastingsi* Hy. Edw. ♀, holotype (Amer. Mus. Nat. Hist.). Right fore wing rubbed near apex; left fore wing above reniform.
- Fig. 17. Underside of preceding (fig. 16).
- Fig. 18. *Drasteria (Drasteria) mirifica mirifica* Hy. Edw. ♀, cotype (Amer. Mus. Nat. Hist.). Neither fore wing is perfect but comparison of the two sides shows all points.
- Fig. 19. *Drasteria (Drasteria) eubapta* Hmpsn. ♀, allotype (British Museum; photograph by courtesy of Mr. W. H. T. Tams).

PLATE V

(All figures on this plate natural size)

- Fig. 1. *Drasteria (Drasteria) graphica graphica* Hbn. ♂. Hind wing yellow and black. Specimen from Belleair, Florida (ex Slosson Collection).
- Fig. 2. *Drasteria (Drasteria) graphica graphica* Hbn. ♀. Hind wing yellow and black. Specimen from St. Petersburg, Florida.
- Fig. 3. *Drasteria (Drasteria) graphica atlantica* B. & McD. ♀. Sexes alike. Upper side on left, under side of same on right. Outer line defining subterminal line very faint in this photograph. Specimen from Pennequid Barrens, Coram, L. I., N. Y., June 2, 1921.
- Fig. 4. *Drasteria (Drasteria) occulta* Hy. Edw. ♀. Hind wing yellow and black. Upper side on left, under side of same on right. Specimen from Clementon, New Jersey, May 19, 1912 (J. H. West).
- Fig. 5. *Drasteria (Drasteria) ingeniculata* Morr. ♂. A good photograph. Specimen from Texas.
- Fig. 6. *Drasteria (Drasteria) ingeniculata* Morr. ♀. A dark female. Specimen from Texas.
- Fig. 7. *Bulia confirmans* Wlk. ♂ (This specimen holotype of *propria* Wlk., British Museum; this and following two figures by courtesy of Mr. W. H. T. Tams).
- Fig. 8. *Bulia confirmans* Wlk. ♀, holotype (British Museum).
- Fig. 9. *Bulia confirmans* Wlk. ♀ (This specimen holotype of *umbrosa* Wlk., British Museum).
- Fig. 10. *Bulia deducta* Morr. ♂, compared with type. Hind wing dirty white, lunule yellow. Specimen from Globe, Arizona.
- Fig. 11. *Bulia deducta* Morr. ♀. Light grey form. Specimen from Indio, California, May 14, 1921.
- Fig. 12. *Bulia deducta* Morr. ♀. This represents the synonymous *vulpina* Hy. Edw. Specimen from Baboquivari Mtns., Pima Co., Arizona, July 1-15, 1923.
- Fig. 13. *Bulia similaris similaris* Rich. ♂, paratype (Amer. Mus. Nat. Hist.). Females of this race similar to male. Upper side on right, under side of same on left. Specimen from Bee Co., Texas.
- Fig. 14. *Bulia similaris californica*, race nov. ♀, holotype.
- Fig. 15. *Drasteria (Aleucanitis) cailino* Lef. ♂. Upper side on right, under side of same on left. Hind wing and



undersides black and white. Specimen from Digne, Bass. Alp., France (Staudinger & Bang-Haas).

- Fig. 16. *Drasteria* (*Aleucanitis*) *catocalis* Stgr. ♂. Specimen from Korla, Turkestan (Staudinger & Bang-Haas). Hind wing yellow and black.
- Fig. 17. *Drasteria* (*Aleucanitis*) *sesquilinea* Stgr. ♂. Hind wing dirty white, darker apically. Specimen from "Uramtschi, Thianshan" (Staudinger & Bang-Haas).
- Fig. 18. *Leucanitis picta* Christ. ♂. Specimen from "Navidu-Stgn., S. E. Russia" (Staudinger & Bang-Haas).
- Fig. 19. *Lois lorina* Druce. Specimen from Royal Palm State Park, Florida, April 12, 1927, at bait (W. S. Blatchley). (Photograph by courtesy of Dr. F. M. Jones.)
- Fig. 20. *Boryzops purissima* Dyar. Specimen from Royal Palm State Park, Florida. (Photograph by courtesy of Dr. F. M. Jones.)

PLATE VI

- Fig. 1. Right valve from male genitalia of *Melipotis* (*Lyncestis*) *acontioides* Gn. Specimen from the vicinity of Chilpancingo, Guerrero, Mexico, November, 1929.
- Fig. 2. Same from *Melipotis* (*Melipotis*) *novanda* Gn. Specimen from Hereford, Arizona, Sept. 22 (Barnes Collection).
- Fig. 3. Same from *M. (M.) agrotoides* Wlk. Specimen from San Benito, Texas, May 1-7.
- Fig. 4. Same from *M. (M.) contorta* Gn. Specimen from Indian River, Florida.
- Fig. 5. Same from *M. (M.) famelica* Gn. Specimen from Pétionville, Haiti, May-June, 1930.
- Fig. 6. Same from *M. (M.) prolata* Wlk. Specimen from Florida (ex Slosson Collection).
- Fig. 7. Same from *M. (M.) jucunda* Hbn. Specimen from Hope, Arkansas, July 7, 1931 (Knobel).
- Fig. 8. Same from *M. (M.) indomita* Wlk. Specimen from Globe, Arizona.
- Fig. 9. Same from *M. (M.) fasciolaris* Hbn. Specimen from Pétionville, Haiti, May-June, 1930.
- Fig. 9a. Aedaeagus of *M. (M.) fasciolaris* Hbn. showing internal spine.
- Fig. 10. Right harpé from *M. (M.) perpendicularis* Gn. Specimen from Port au Prince, Haiti, Jan. 1-8, 1922.
- Fig. 11. Same from *M. (M.) cellaris* Gn. Specimen from Brownsville, Texas, 2-11 (Geo. Dorner).
- Fig. 12. Same from *M. (M.) nigrobasis* Gn. Specimen from Brownsville, Texas, 2-11 (Geo. Dorner, in Barnes Collection).
- Fig. 13. Same from *M. (M.) januaris* Gn., but with the dorso-basal parts including the clavus drawn at greater magnification alongside. Specimen from Florida City, Florida, May 22, 1933 (Mrs. L. E. Forsyth).
- Fig. 14. Lateral view of uncus of *M. (M.) jucunda*.
- Fig. 15. Female genitalia (ventral view) of *Ianius mosca* Dyar. Specimen from Alpine, Texas, Aug. 1-7, 1926 (O. C. Poling, in Barnes Collection).
- Fig. 16. Male genitalia of *Ianius mosca* Dyar. Aedaeagus drawn below and enlarged mesal views of clavi drawn on their respective sides. Specimen from Alpine, Texas, July 15-21, 1926 (O. C. Poling, in Barnes Collection).

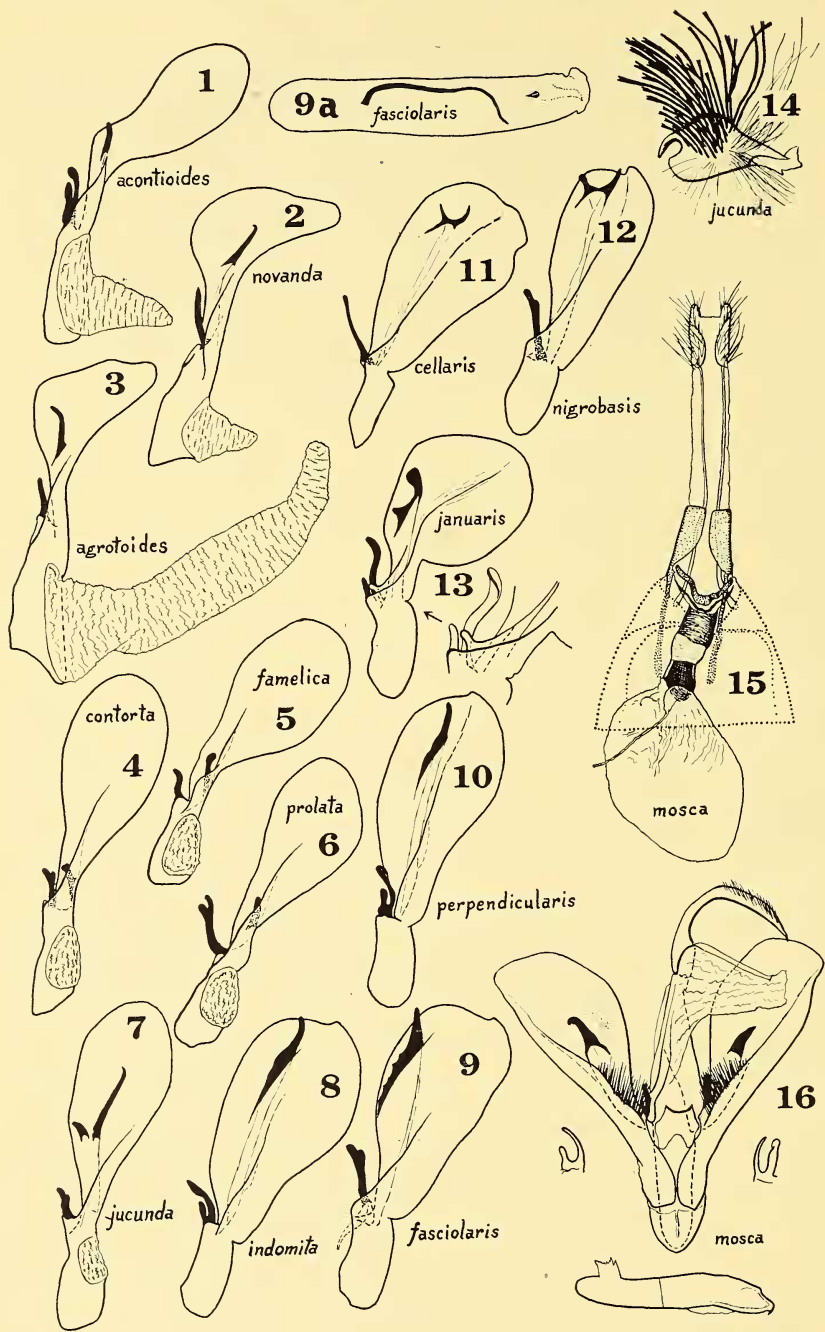


PLATE VII

- Fig. 1. Male genitalia of *Drasteria (Synedoida) fumosa brunnei-fasciata* B. & McD. Aedaeagus of same drawn alongside. Specimen from Supai, Havaisu Canyon, Arizona, Aug. 2, 1934 (E. L. Bell, in Amer. Mus. Nat. Hist.).
- Fig. 2. Male genitalia of *Drasteria (Synedoida) divergens* Behr. Specimen from Southern Utah, June, 1900 (O. C. Poling).
- Fig. 3. Male genitalia of *Drasteria (Synedoida) pallescens* G. & R. Specimen from Zion National Park, Utah.
- Fig. 4. Male genitalia of *Drasteria (Synedoida) edwardsi* Behr. Specimen without data.
- Fig. 5. Male genitalia of *Drasteria (Synedoida) inepta* Hy. Edw. Specimen from Jemez Springs, New Mexico, Aug. 10, 1920 (Woodgate).
- Fig. 6. Male genitalia of *Drasteria (Synedoida) sabulosa* Hy. Edw. Fig. 6a. Aedaeagus of same drawn alongside. Specimen from Glenwood Springs, Colorado, 6-5-94 (Cornell Univ. Collection, ex Barnes Collection).
- Fig. 7. Male genitalia of *Drasteria (Synedoida) nichollae* Hmpsn. Specimen from Seton Lake, Lillooett, British Columbia, June 28, 1926 (in Canadian National Collection).
- Fig. 8. Male genitalia of *Drasteria (Synedoida) biformata* Hy. Edw. Cotype. Aedaeagus of same drawn alongside. (Amer. Mus. Nat. Hist.)

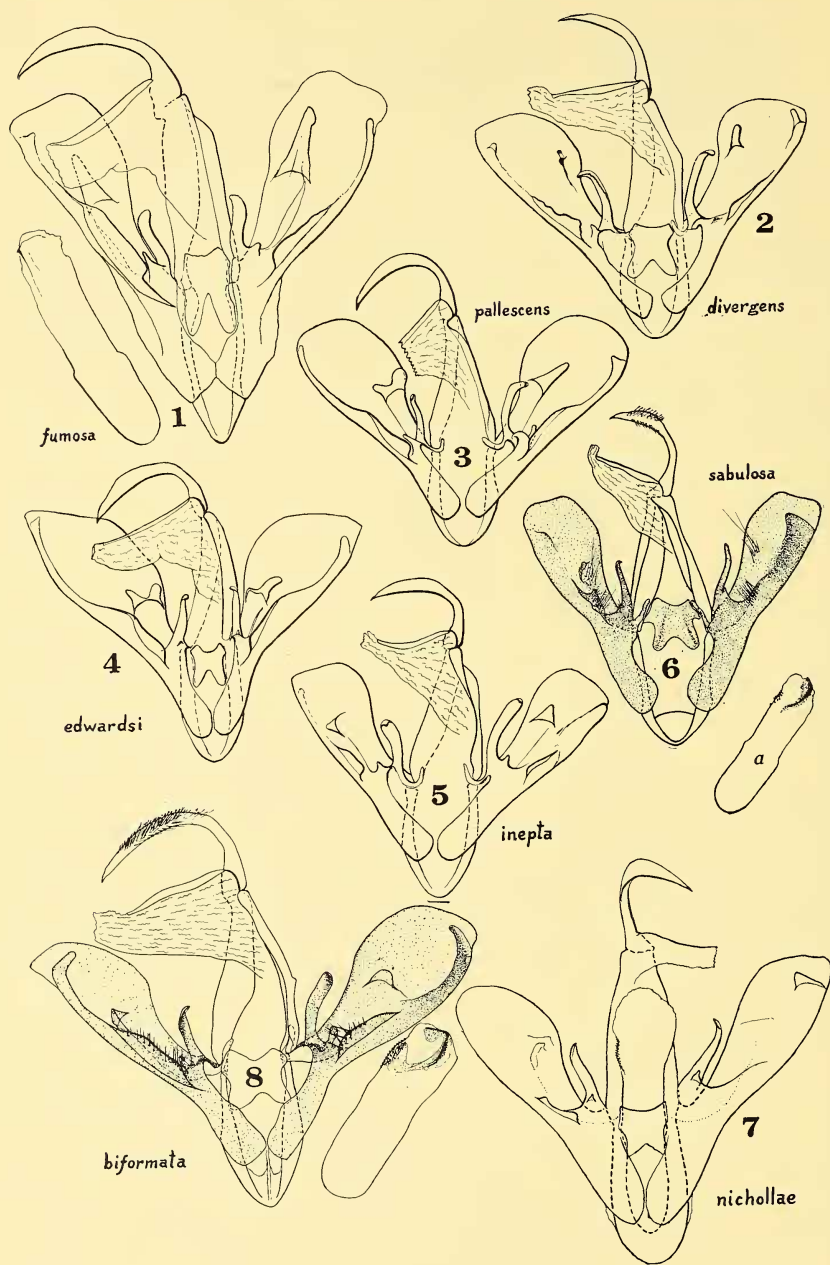


PLATE VIII

- Fig. 1. Male genitalia of *Drasteria* (*Drasteria*) *adumbrata alleni* Grt. Specimen from Muskoka, Ontario, July 18, 1934.
- Fig. 2. Male genitalia of *Drasteria* (*Drasteria*) *adumbrata alleni* Grt. These genitalia very similar to those shown in figure 1, the seeming differences largely due to position of parts in mounting. Specimen from Peru, Adirondacks Mtns., New York, June, 1924 (in Cornell Univ. Collection).
- Fig. 3. Male genitalia of *Drasteria* (*Drasteria*) *perplexa* Hy. Edw. Specimen from Colorado (ex Colorado Agric. College Collection).
- Fig. 4. Male genitalia of *Drasteria* (*Drasteria*) *petricola athabasca* Neum. Specimen from Kelwood, Manitoba, July 1, 1924 (J. F. May). This specimen really form *crockeri*.
- Fig. 5. Male genitalia of *Drasteria* (*Drasteria*) *howlandi* Grt. Specimen from Three Forks, Montana, July 12, 1929.
- Fig. 6. Male genitalia of *Drasteria* (*Drasteria*) *tejonica* Behr. Specimen from Esmeralda Co., Nevada (ex Barnes Collection).
- Fig. 7. Male genitalia of *Drasteria* (*Drasteria*) *hudsonica hudsonica* G. & R. Specimen from Banff, Alberta.
- Fig. 8. Male genitalia of *Drasteria* (*Drasteria*) *hudsonica heathi* B. & McD. Specimen from Miles City, Montana.
- Fig. 9. Male genitalia of *Drasteria* (*Drasteria*) *pulchra* B. & McD. Specimen from Jacumba, San Diego Co., California, April 28, 1935 (G. P. Engelhardt).
- Fig. 10. Male genitalia of *Drasteria* (*Drasteria*) *pulchra* B. & McD. Same data as preceding.

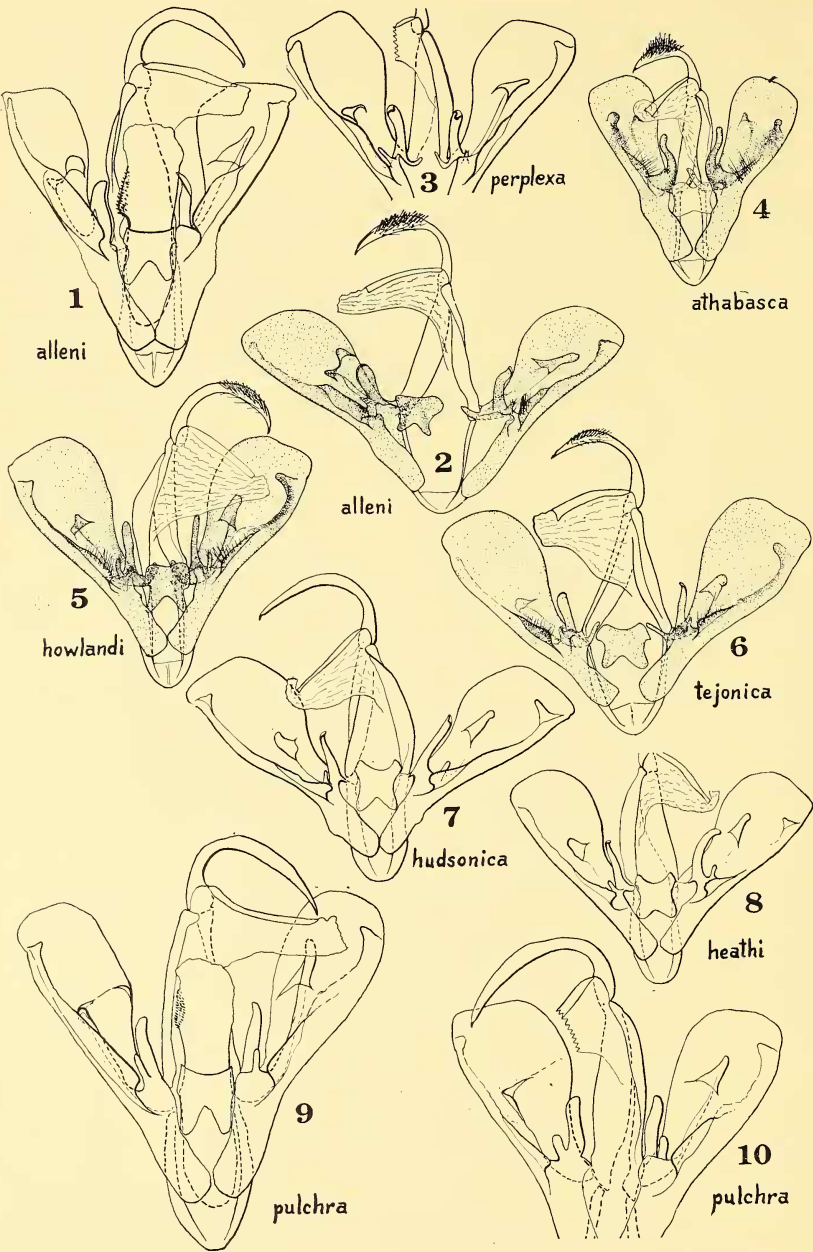


PLATE IX

- Fig. 1. Male genitalia of *Drasteria* (*Drasteria*) *stretchii* Behr.
Fig. 1a. Aedaeagus of same. Specimen from Nevada
(In Henry Edwards' Collection at the Amer. Mus. Nat.
Hist., and labeled "agrees with type, H. E.").
- Fig. 2. Portion of left harpé of another specimen of *Drasteria*
(*Drasteria*) *stretchii* Behr. Specimen without data.
- Fig. 3. Male genitalia of *Drasteria* (*Synedoida*) *ochracea* Behr.
Specimen from Globe, Arizona.
- Fig. 4. Male genitalia of *Drasteria* (*Drasteria*) *ingeniculata* Morr.
Specimen from Texas.
- Fig. 5. Male genitalia of *Drasteria* (*Drasteria*) *eubapta* Hmps. n.
Specimen from near Salton Sea, Imperial Valley, Cali-
fornia, March 10, 1932 (Los Angeles Museum).
- Fig. 6. Portion of left harpé of specimen of *Drasteria* (*Drasteria*)
eubapta Hmps. n. Specimen from Yuma, Arizona
(same lot as types; in Canadian National Collection).
- Fig. 7. Male genitalia of *Drasteria* (*Drasteria*) *mirifica mirifica*
Hy. Edw. Specimen from Loma Linda, San Ber-
nardino Co., California, Aug. 8-16 (ex Barnes Collec-
tion).
- Fig. 8. Male genitalia of *Drasteria* (*Drasteria*) *mirifica hastingsi*
Hy. Edw. Specimen from Ft. Klamath, Oregon.

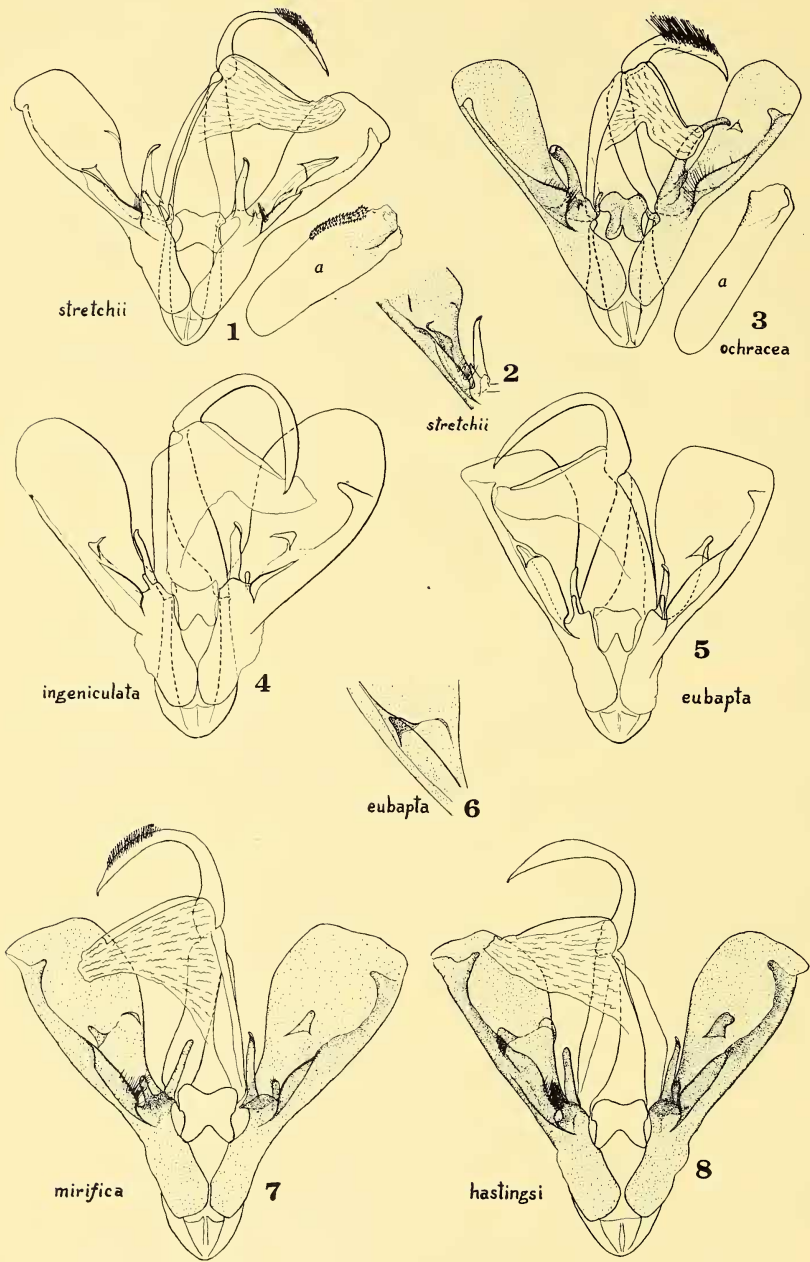


PLATE X

- Fig. 1. Female genitalia of *Drasteria (Synedoida) scrupulosa* Hy. Edw. Cotype. (Amer. Mus. Nat. Hist.)
- Fig. 2. Female genitalia of *Drasteria (Synedoida) inepta* Hy. Edw. Specimen from Jemez Springs, New Mexico, July, 1920 (Woodgate).
- Fig. 3. Female genitalia of *Drasteria (Synedoida) edwardsi* Behr. Specimen from Menlo Park, California, July 10, 1932.
- Fig. 4. Female genitalia of *Drasteria (Synedoida) sabulosa sabulosa* Hy. Edw. This specimen a cotype from Southern Colorado (Amer. Mus. Nat. Hist.).
- Fig. 5. Female genitalia of *Drasteria (Synedoida) biformata* Hy. Edw. Cotype (Amer. Mus. Nat. Hist.).
- Fig. 6. Female genitalia of *Drasteria (Synedoida) pallescens* G. & R. Specimen from Miles City, Montana, July 27, 1931.
- Fig. 7. Female genitalia of *Drasteria (Synedoida) fumosa brunneifasciata* B. & McD. Specimen from Mt. Lowe, California, Aug. 1, 1924.
- Fig. 8. Female genitalia of *Drasteria (Synedoida) divergens* form *socia* Behr. Specimen from Verdugo, Los Angeles Co., California.

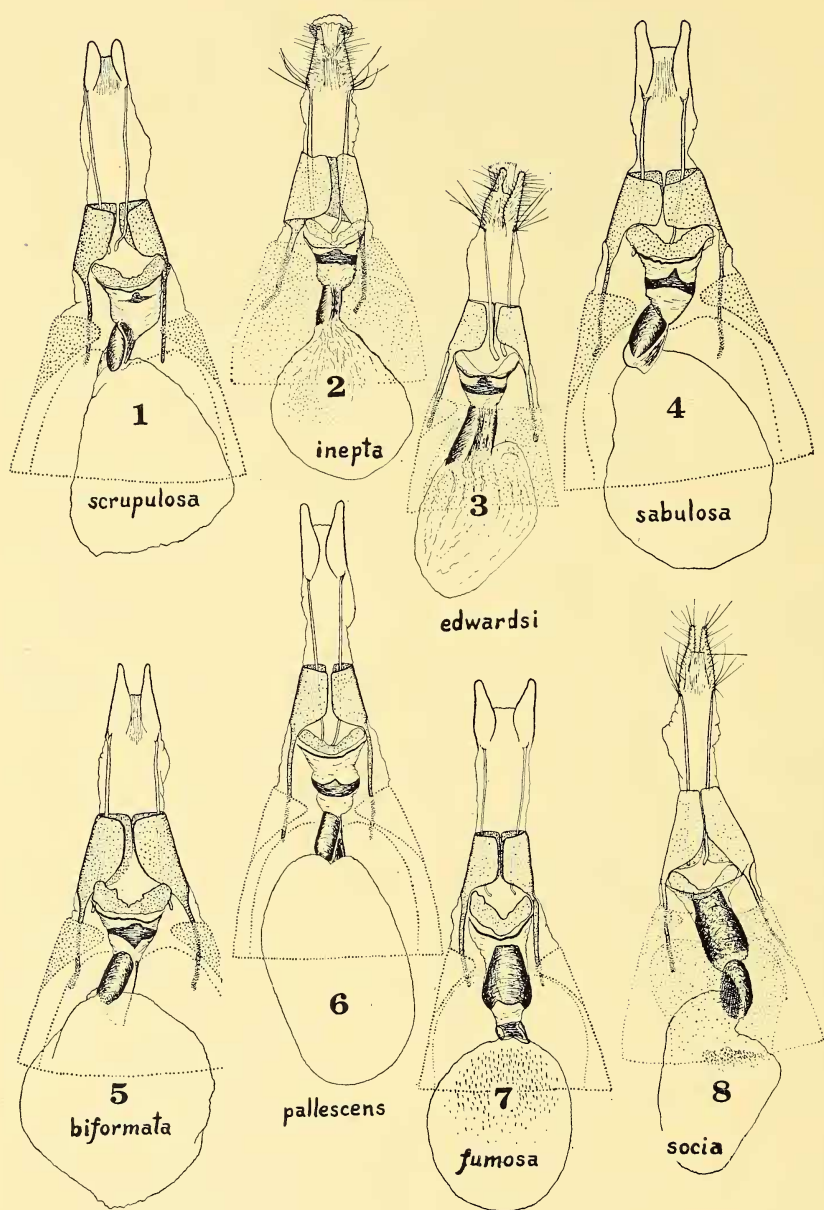


PLATE XI

- Fig. 1. Female genitalia of *Drasteria (Drasteria) mirifica hastingsi* Hy. Edw. (This specimen the unique type of *perpallida* Hy. Edw.) Part of bursa omitted.
- Fig. 2. Female genitalia of *Drasteria (Drasteria) mirifica mirifica* Hy. Edw. Cotype (Amer. Mus. Nat. Hist.). Bursa omitted.
- Fig. 3. Vulval region of female genitalia of *Drasteria (Drasteria) mirifica hastingsi* Hy. Edw. Specimen from Pateros, Washington, April 21, 1930.
- Fig. 4. Same of another specimen (*hastingsi*) from Pateros, Washington, August 15, 1930.
- Fig. 5. Same of *Drasteria (Drasteria) mirifica klotsi*, race nov. Paratype from Colorado.
- Fig. 6. Female genitalia of *Drasteria (Drasteria) eubapta* Hmps. Specimen from Imperial Co., California, March 10, 1932 (in Los Angeles Museum).
- Fig. 7. Female genitalia of *Drasteria (Drasteria) hudsonica hudsonica* G. & R. Specimen from Bozeman, Montana, July 11, 1932.
- Fig. 8. Female genitalia of *Drasteria (Drasteria) hudsonica heathi* B. & McD. Specimen from Miles City, Montana, July 27, 1931. Vulval region only.
- Fig. 9. Female genitalia of *Drasteria (Drasteria) howlandi* Grote. Specimen from Ackmen, Colorado, Aug. 3, 1930.
- Fig. 10. Vulval region of female genitalia of *Drasteria (Drasteria) howlandi* var. Specimen from Pateros, Washington, April 21, 1930.
- Fig. 11. Female genitalia of *Drasteria (Aleucanitis ?) grandirena* Haw. Specimen from Rochester, New York, July 14, 1932 (A. G. Richards, Jr.).
- Fig. 12. Female genitalia of *Drasteria (Drasteria) stretchii* Behr. Compare figure 13. Specimen from Nevada (Amer. Mus. Nat. Hist.).
- Fig. 13. Lateral view of part of female genitalia of *Drasteria (Drasteria) adumbrata* Behr. Compare figure 12 which is a ventral view (the female genitalia of *adumbrata* and *stretchii* are not separable).

